

**EPIDEMICS RESULTING
FROM WARS**

PRINTED IN ENGLAND
AT THE OXFORD UNIVERSITY PRESS

Carnegie Endowment for International Peace

DIVISION OF ECONOMICS AND HISTORY

John Bates Clark, Director

**EPIDEMICS RESULTING
FROM WARS**

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OXFORD: AT THE CLARENDON PRESS

London, Edinburgh, New York, Toronto, Melbourne and Bombay

HUMPHREY MILFORD

1916

PRINZING F

INTRODUCTORY NOTE BY THE DIRECTOR

THE Division of Economics and History of the Carnegie Endowment for International Peace is organized to 'promote a thorough and scientific investigation of the causes and results of war'. In accordance with this purpose a conference of eminent statesmen, publicists, and economists was held in Berne, Switzerland, in August 1911, at which a plan of investigation was formed and an extensive list of topics was prepared. The programme of that Conference is presented in detail in an Appendix. It will be seen that an elaborate series of investigations has been undertaken, and the resulting reports may in due time be expected in printed form.

Of works so prepared some will aim to reveal direct and indirect consequences of warfare, and thus to furnish a basis for a judgement as to the reasonableness of the resort to it. If the evils are in reality larger and the benefits smaller than in the common view they appear to be, such studies should furnish convincing evidence of this fact and afford a basis for an enlightened policy whenever there is danger of international conflicts.

Studies of the causes of warfare will reveal, in particular, those economic influences which in time of peace bring about clashing interests and mutual suspicion and hostility. They will, it is believed, show what policies, as adopted by different nations, will reduce the conflicts of interest, inure to the common benefit, and afford a basis for international confidence and good will. They will further reveal the natural economic influences which of themselves bring about more and more harmonious relations and tend to substitute general benefits for the mutual injuries that follow unintelligent self-seeking. Economic internationalism needs to be fortified by the mutual trust that just dealing creates; but

just conduct itself may be favoured by economic conditions. These, in turn, may be created partly by a natural evolution and partly by the conscious action of governments; and both evolution and public action are among the important subjects of investigation.

An appeal to reason is in order when excited feelings render armed conflicts imminent; but it is quite as surely called for when no excitement exists and when it may be forestalled and prevented from developing by sound national policies. To furnish a scientific basis for reasonable international policies is the purpose of some of the studies already in progress and of more that will hereafter be undertaken.

The publications of the Division of Economics and History are under the direction of a Committee of Research, the membership of which includes the statesmen, publicists, and economists who participated in the Conference at Berne in 1911, and two who have since been added. The list of members at present is as follows:

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The function of members of this Committee is to select collaborators competent to conduct investigations and present reports in the form of books or monographs; to consult with these writers as to plans of study; to read the completed manuscripts, and to inform the officers of the Endowment whether they merit publication in its series. This editorial function does not commit the members of the Committee to any opinions expressed by the writers. Like other editors, they are asked to vouch for the usefulness of the works, their scientific and literary merit, and the advisability of issuing them. In like manner, the publication of the monographs does not commit the Endowment as a body or any of its officers to the opinions which may be expressed in them. The standing and attainments of the writers selected afford a guarantee of thoroughness of research and accuracy in the statement of facts, and the character of many of the works will be such that facts, statistical, historical, and descriptive, will constitute nearly the whole of their content. In so far as the opinions of the writers are revealed, they are neither approved nor condemned by the fact that the Endowment causes them to be published. For example, the publication of a work describing the attitude of various socialistic bodies

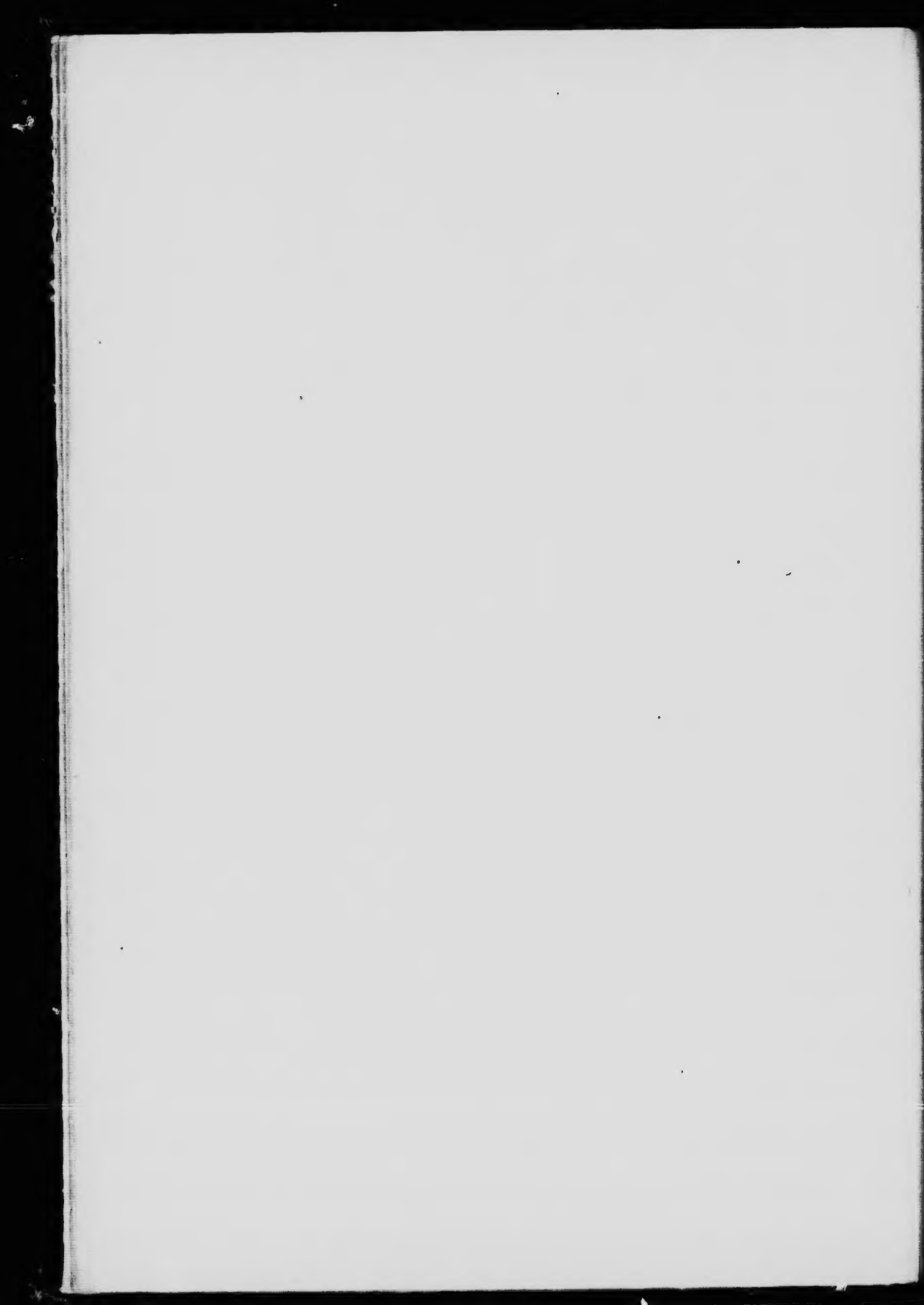
on the subject of peace and war implies nothing as to the views of the officers of the Endowment on the subject of socialism ; neither will the issuing of a work, describing the attitude of business classes toward peace and war, imply any agreement or disagreement on the part of the officers of the Endowment with the views of men of these classes as to a protective policy, the control of monopoly, or the regulation of banking and currency. It is necessary to know how such men generally think and feel on the great issue of war, and it is one of the purposes of the Endowment to promote studies which will accurately reveal their attitude. Neither it nor its Committee of Research vouches for more than that the works issued by them contain such facts ; that their statements concerning them may generally be trusted, and that the works are, in a scientific way, of a quality that entitles them to a reading.

This monograph on epidemics resulting from wars is designed to bring into light an aspect of international conflict that has never been adequately appreciated. An examination of the facts here presented will indicate that until comparatively recent times the most serious human cost of war has been not losses in the field, nor even the losses from disease in the armies, but the losses from epidemics disseminated among the civil populations. It was the war epidemics and their sequelae, rather than direct military losses, that accounted for the deep prostration of Germany after the Thirty Years' War. Such epidemics were also the gravest consequence of the Napoleonic Wars.

It may appear that a study of war epidemics can have only historical interest, in view of the progress of modern medical science. Plague, cholera, and typhus can be brought under control by modern methods of sanitation. One can point to the fact that in the present great war, the only serious epidemic that has been reported is the typhus fever epidemic in Serbia. When the medical history of the war comes to be written, however, it will be found that the

aggregate losses from sporadic outbreaks of war epidemics have been very considerable. A war sufficiently protracted to lead to universal impoverishment and a break-down of medical organization would be attended, as in earlier times, by the whole series of devastating war epidemics. And even in the case of less exhausting wars, the chances of widespread epidemics is far from negligible. There is much food for reflection in the author's account of the small-pox epidemic following the Franco-German War. In 1870 the means of coping with small-pox were as nearly perfect as they are in the greater part of the world to-day. This fact did not save Europe from a widespread epidemic, entailing human losses exceeding in gravity the losses in the field. To-day, as in the past, the probabilities of increased morbidity in the civil population, not only among the belligerents, but among neutrals as well, must be entered as a highly important debit item against war.

JOHN BATES CLARK,
Director.



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INTRODUCTION

IN countries which have the misfortune to be the scene of protracted wars, the mortality regularly undergoes a considerable increase. This is caused chiefly by the infectious diseases which in war times so often appear in the form of epidemics. These diseases, moreover, not only afflict the country in which the war is waged, but are also carried by prisoners, returning soldiers, and in other ways, into the land of the victor, where it is possible for them to spread over a large territory. A report on the loss of human life among that part of a population which does not participate in a war has not yet been undertaken, writings on war pestilences usually confining themselves to the losses within the armies themselves.¹ It is the purpose of the present study to investigate the losses sustained by the non-belligerent part of the population in consequence of epidemics caused by wars.

In doing this it seems advisable to select a few war pestilences which on account of their enormous extent are particularly notable, and to subject them to an exhaustive discussion. This method has the advantage that it will enable us to show in individual cases how it is possible for these pestilences to extend over such a vast territory, under

¹ This subject is discussed in a general way in the following works: J. Pringle, *Beobachtungen über die Krankheiten einer Armee sowohl im Felde als in Garnison*. Translation by J. E. Greding. Altenburg, 1754.—Gurlt, *Zur Geschichte der internationalen und freiwilligen Krankheitspflege im Kriege*. Leipzig, 1873.—A. Laveran, *Traité des maladies et épidémies des armées*. Paris, 1875.—L. Uettermann zu Schaffenberg, *Zur Geschichte der Heilkunde: Darstellungen aus dem Bereiche der Volkskrankheiten und des Sanitätswesens im Deutschen Mittelalter mit besonderer Berücksichtigung der Lugenepidemien und der Militärkrankenpflege*. Berlin, 1875.—Knaak, *Die Krankheiten im Kriege*. Leipzig, 1900.—von Linstow, *Kriege, Schlachten und Belagerungen, in denen nicht die feindlichen Waffen, sondern Krankheiten das entscheidende Moment waren*. *Deutsche mil.-ärztl. Zeitschrift*, vol. xxix, p. 177, 1900.—H. Westergaard, *Die Lehre von der Mortalität und Morbilität*. Second edition. Jena, 1901. pp. 223, 254, 260, 264, 566.—H. Schwiening, *Krieg und Friede*, in Th. Weyl, *Handbuch der Hygiene*. 4. Supplement, B. 1904. P. 65.

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what circumstances they spread from place to place, and how they enter regions remote from the scene of war. For this exhaustive discussion the writer has chosen the pestilences that occurred during the Thirty Years' War, the epidemic of typhus fever after Napoleon's Russian Campaign, and the pandemic of small-pox after the Franco-German War of 1870-1. These epidemics afford very instructive examples of what horrible losses both friends and enemies may sustain in consequence of war pestilences.

While the outbreaks of 'plague' in the course of the Thirty Years' War have already been made the subject of a comprehensive account, strange to say there are no such accounts of the other two epidemics; to give a clear picture of these pestilences the writer was therefore constrained to collect the necessary information from widely dispersed sources. In gathering his material a number of large German libraries assisted him most kindly—particularly, the Royal National Library at Stuttgart and the University libraries of Strassburg and Tübingen.

The other parts of the history of war pestilences are set forth in a more general way; for an exhaustive treatment of them would have necessitated several years of preliminary work, which the writer in the short time at his disposal was unable to undertake.

The writer has drawn as much as possible from original sources; this applies at least to the pestilences of the Napoleonic Period, and to the epidemic of small-pox after the Franco-German War. It would have been impossible to deal with the other wars in the same way without consuming considerable time. From the bibliographies it will appear what sources the author has consulted; rarely are quotations given from works which he has not seen, and in such cases it is indicated whence they were taken.

The causes of the origin and spread of pestilences during a war are clear. Every aggregation of people, even in times of peace, at celebrations and annual fairs, in barracks, and

so forth, is necessarily exposed to the danger of pestilence; but this danger is ten times as great in large assemblages of troops during a war. The soldiers are then subjected to all possible kinds of hardship and suffering—lack of food, or food which is inferior and badly cooked, sleeping out in the cold and rain, fatiguing marches, constant excitement, and homesickness—and all these things greatly lessen their power of resistance. When large bodies of troops are obliged to remain in one and the same place for a considerable length of time, the additional difficulty presents itself of keeping the locality unpolluted by the excrement of men and animals, and by refuse of all kinds. If an infectious disease reveals its presence in such an aggregation of people, energetic and stringent measures must be adopted, even in times of peace, to prevent it from spreading. In war times it is often impossible to take the necessary precautions, since the attention of the commanders is directed toward very definite objects, to which all other considerations are subordinate. Whether the germ of the disease is already in the place, or whether the soldiers bring it with them, in either case there is danger that the fighting armies will cause the disease to spread over the entire scene of the war, and thus seriously endanger thousands of human lives.

Modern methods of sanitation have done much toward preventing the spread of army pestilences, not only in peace, but also in war. The last few decades have evinced that fact. Whatever attitude we may assume toward the question whether war can ever be wholly abolished, we must all agree that, if war has once broken out, all possible means must be employed to prevent the spreading of pestilence within the armies. Here the interests of the people and of the commanders coincide, since the efficiency of armies is often seriously interfered with by the outbreak of pestilence, and not infrequently the success or failure of a war depends, not upon the outcome of its battles, but upon the appearance or non-appearance of pestilence.

CHAPTER I

WAR PESTILENCES

ALL infectious diseases may spread in consequence of war and develop into epidemics of varying extent. In the next chapter we shall see how the wars at the end of the fifteenth century favoured the spread of an epidemic of syphilis. In the Union Army, during the American Civil War of 1861-5, both measles and typhoid fever were very widespread, and together they were the cause of 4,246 deaths, or about 1.75 per cent of the total enlistment. Scarlet fever, influenza, yellow fever, relapsing fever, and malaria (if the war is waged in countries where this disease is endemic—especially in the Lower Danube region, in the Netherlands, Spain, and Italy) have also played an important rôle in many wars. But we give the name 'war pestilences' only to those infectious diseases which in the course of centuries have usually followed at the heels of belligerent armies, such as typhus fever, bubonic plague, cholera, typhoid fever, dysentery, and small-pox; we may also include here scurvy, the etiology of which has not yet been definitely determined.

1. *Typhus fever* (spotted fever, exanthematic typhus—called in France and England simply typhus, in Spain tabardillo¹—formerly called contagious typhus, hunger typhus, camp fever, and Hungarian fever) is an acute infectious disease of cyclic recurrence, which resembles typhoid fever only in name. From the eighth to the tenth day after infection, often somewhat sooner or later, it begins with a chill, accompanied by nausea, vomiting, violent headache, and psychic depression. In the first few days the patient's temperature rises rapidly, and on the fourth or

¹ We must remember that the word 'typhus', without further qualification, in Germany means typhoid fever, whereas in France and England it means typhus fever.

fifth day a rash in the form of dull-red spots, as large as a pea, breaks out over the entire body. These spots gradually grow larger, and after two or three days, through the appearance of very small haemorrhages, change into petechiae. The apathy of which the patient first gave evidence now gives way to wild delirium. At the end of the second week the temperature falls rapidly, and in one or two days becomes normal; often, however, the fall of temperature takes from six to eight days. The duration of the entire disease, accordingly, is from two to two and a half weeks. Death usually occurs at the crisis of the disease—from the tenth to the twelfth day—rarely between the sixth and ninth days or after the twelfth.

The danger of the disease varies greatly in different epidemics; statements regarding this point diverge according as we refer to the statistical records of hospitals or to the private practice of physicians. With the latter the number of deaths is smaller, since persons suffering from the disease in mild form less often go to the hospitals. Epidemics in which a quarter of the patients, and even more, have succumbed have frequently occurred, especially in war times, during famines, &c. The cause (infective agent) of typhus fever is not known; according to recent investigations it is spread by vermin; Ricketts and others have fixed responsibility for it upon the body louse. The infection is communicated from man to man, and very often it is contracted from the clothes, linen, and other effects of typhus patients. Recovery from the disease usually renders a person immune against a second attack. Typhus fever frequently appears nowadays in the eastern and south-eastern parts of Europe, in Hungary and Galicia, and also in Spain, Italy, and Ireland.

2. *Plague* appears in two forms, depending upon the place where the infective agent enters the body: the bubonic plague and the pneumonic plague. In the case of the former the painful plague-sores (buboes) develop, usually two or three days after infection, from the lymphatic glands; these

sores,—which appear most often in the region of the groin, less often in the axilla, on the neck, lower jaw, and in other places,—soon suppurate. There is either a development of toxins, which are the cause of the severe general symptoms, or else the *bacilli pestis* go from the glands into the circulatory system and cause septicaemia, which is quickly fatal. Pneumonic plague takes the form of a catarrhal inflammation of the lungs, causing a profuse and bloody expectoration, which contains large quantities of bacilli. This form of the disease almost always ends fatally in a few days. The mortality of bubonic plague is somewhat lower; the disease has an average duration of eight days, and carries away from fifty to seventy per cent of its victims.

In the Middle Ages an epidemic of plague (black death) ravaged all Europe. At the present time it is still endemic in India, in southern China, in Egypt, in Uganda, and perhaps in other countries, whence it frequently develops into general epidemics.

The infective agent in the case of plague is the *bacillus pestis*, identified in 1894 by Kitasato, and subsequently, but independently, by Yersin. Rats, which are very susceptible to the disease, play an important rôle in spreading it; in India the outbreak of a plague epidemic is always preceded by the dying of large numbers of rats. Their excrement contains large quantities of bacilli, which may be destructive to human beings. The rat-flea is also known to carry the infection. The infection may be conveyed directly by plague patients, when the buboes suppurate, or when the blood becomes generally infected with the *bacilli pestis*, which are contained in abundance in the sputum, urine, and excrement, or when the lungs are affected and the patient charges the atmosphere by coughing. One who has recovered from the disease is usually immune for life.

3. *Cholera*, after an incubation period of two to eight days, begins with frequent (ten to twenty times a day) vomitings of a fluid like rice-water, and incessant retching. The patient,

owing to the great loss of water, sinks rapidly ; he acquires a corpse-like appearance, loses consciousness, and death may result on the first or second day. If the attack is survived, the patient frequently dies from sheer exhaustion afterwards. The mortality of cholera is great—from forty to fifty per cent of his victims die. In this calculation the numerous cases of cholera, that are always prevalent during cholera times, are excluded. Recovery from the disease does not protect a person against contracting it again. The infective germ in the case of cholera is the 'comma bacillus', discovered by Robert Koch in 1883. The spread of cholera is caused by the penetration of the *comma bacillus* into the alimentary canal, resulting from contact with objects which have been contaminated by the evacuations of cholera patients ; less frequently it is indirectly caused by the pollution, from evacuations, of water used for drinking or washing purposes.

4. *Dysentery* has always played an important rôle in military campaigns. To be sure, it is not very dangerous so far as the patient's life is concerned, but in war times, owing to irregular nursing and scanty nourishment, and the consequent use of unsuitable food, it may spread over a large territory and be very destructive to large numbers of soldiers and other people.

There are two distinct forms of the disease—amoebic dysentery and bacillary dysentery. The latter is caused by the *bacillus pyocyaneus*, discovered independently by Stiga, Kruse, and Flexner. The disease used to be common throughout Europe ; at the present time it appears in Central and Western Europe only in small epidemics, whereas in Eastern Europe it spreads over large territories. It causes frequent, often blood-coloured, defecations, accompanied by griping pains in the abdomen and a distressing pressure (tenesmus). The disease lasts from one to one and a half weeks, but for a long time after recovery the patient's alimentary canal is very sensitive to improper nourishment.

The disease is transmitted either by direct contact, since the evacuations of the bowels contain large quantities of bacilli, or by infected water. Amoebic dysentery, occurring in tropical countries (Southern Europe, Egypt, Southern Asia, Central America, &c.), is much more dangerous; it is caused by an amoeba, carefully studied by Kartulis, and very often acquires a chronic character, sometimes causing abscess of the liver.

5. *Typhoid fever* (called in England 'enteric fever', in France 'fièvre typhoïde', in Italy 'febbre tifoidea') in many wars has been very widespread among the armies; for example, in the American Civil War, in the Franco-German War (Metz), and in the Russo-Turkish War of 1877-8. The progress of the disease is well known; between the time of infection and the outbreak of the sickness nine to eleven days usually intervene, sometimes even as much as three weeks. In the first week the temperature of the patient rises slowly, during the second week it remains at about the same height, while in the third week it abates considerably, becoming normal in the course of the fourth week. The spleen enlarges a great deal, and in the second week small pale-red spots (roseola), scarcely as large as a pea, appear on the buttocks and especially on the belly. The patient's bowel-movements, at first normal, now becomes diarrhoeal, while certain psychic disorders also manifest themselves, usually in the form of a heavy somnolence. In the third week the patient's life is threatened by complications in the intestines—haemorrhage or perforation. Characteristic of the disease are the anatomical changes of the small intestine—at first enlargement, and later ulceration of Peyer's patches. The infective agent in the case of typhoid fever is a bacillus, identified by Gaffky in 1882. It lodges in the alimentary canal, and is conveyed by food that has been touched with hands † which matter containing the bacillus has adhered, or else in contaminated water used for drinking or other purposes. From eight to ten per cent of the patients

die, while a single recovery usually insures immunity against a second attack.

6. *Small-pox* has an incubation period of ten to fourteen days. The disease begins with a chill, accompanied by violent headache. On the third day the eruption appears; little papules develop and quickly change into pustules, showing themselves first on the face, then on the back, arms, and hands, and finally on the legs and feet. On the ninth day the pustules suppurate, and after that gradually dry up; if it progresses favourably, the disease is over in two or two and a half weeks.

In the case of small-pox the infective agent is not yet known; infection is caused by contact with a patient, or with objects which he is using or has used. It is particularly dangerous to touch things on which the contents of the pustules have dried, for such articles remain infectious for a long time. Recovery from the disease usually renders a person immune for life. The mortality in different epidemics varies greatly; most dangerous of all is the so-called 'black small-pox' (haemorrhagic small-pox, with bleeding in the pustules and under the skin). The total number of deaths in an epidemic of small-pox is dependent upon whether the disease appears in a vaccinated or an unvaccinated community; in the latter case the mortality may reach thirty per cent, whereas in the former case only three or four per cent of the patients die. Vaccination renders a person immune for eight to twelve years, while, if the disease breaks out anywhere in spite of vaccination, the number of fatal cases is very few. It should be noted that small-pox was formerly dreaded, not only because of its danger to life, but also because it frequently leaves a person disfigured for life, and in rare instances causes total blindness.

7. *Scorbutus* (scurvy) used to be a common disease on ships, in prisons, and in times of famine; it appeared with the greatest malignancy in besieged cities—Thorn, Nuremberg, Alexandria, Port Arthur, &c. The real cause of the

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disease is unknown, although too much food of one kind, particularly lack of fresh vegetables, together with long confinement in poorly ventilated and dark rooms, are important causative factors. Inasmuch as the disease almost always appears in the form of an epidemic, it is probable that there is a specific infective agent. It begins with a general feeling of weakness; the skin and mucous membranes become pale and sallow, the gums become inflamed and ulcerated, and small and large extravasations of blood take place in the skin and muscles, and at the joints and knuckles. In serious cases haemorrhages occur in the intestines, kidneys, bladder, and uterus. A change of diet and surroundings will quickly cure scurvy; otherwise progressive anaemia will result in death.

CHAPTER II

THE TIME BEFORE THE THIRTY YEARS' WAR

NUMEROUS as are the historical notices in former years regarding the destruction of armies by pestilence, correspondingly few are the detailed reports on the spread of pestilence among the non-belligerent population. The best-known example from antiquity is the *Plague of Athens* (430-425 B.C.), described by Thucydides. The plague began in the second year of the Peloponnesian War, a few days after the invasion of the Peloponnesians. That it is famous is due to the classical description of it by Thucydides, himself a sufferer from the disease. The Plague of Athens broke out in the Piræus, a fact which has led to the inference that it was borne thither by mariners from Egypt. At the time of the invasion of the Peloponnesians, thousands of country people fled to the city of Athens, which on the advice of Pericles opened its gates to them; thus more than 400,000 people were crowded together within its walls. The first outbreak of the plague lasted two years, then there was an intermission of a year and a half, whereupon it commenced anew. The second outbreak, according to Diodorus, carried away 4,400 hoplites, 300 cavalrymen, a large (but uncertain) number of other soldiers, and 10,000 women and slaves. The plague also penetrated to other places, sparing, however, the Peloponnesus. The nature of the sickness described by Thucydides cannot be positively determined; it has been referred to as bubonic plague (Sprengel), as small-pox (Krause-Daremborg, Kobert), as typhus fever (Häser, Kanngiesser), as typhoid fever (Seitz), and even as anthrax. All we know for certain is that it was some highly infectious

disease, recovery from which rendered a person immune. Krauss and Hecker believe that it was a special disease ('antique plague'), which no longer occurs.¹

The *Plague of the Antonines*, also called the 'Plague of Galen', which ravaged Italy in A.D. 166-8, has also been brought into connexion with warlike events. Avidius Cassius, who preceded Verus in command of the army, had been sent to Syria for the purpose of suppressing a rebellion, and there, after the capture of Seleucia, the plague broke out. It was borne by the troops back to Rome, where, after the triumphal procession of 166, it spread far and wide, so that it was necessary to load its victims on wagons and carry them off for burial. The plague spread from Italy to Gaul, to the very banks of the Rhine, and a large part of the province was literally depopulated—decayed and deserted villages were found everywhere. Häser inclines to the view that it was an epidemic of small-pox, while Laveran, Hecker, Krause, and Littré believe that it was neither small-pox nor typhus fever, but 'antique plague'.²

The expeditions of the German emperors to Italy, as well as the Crusades, offer numerous examples of how large armies may be destroyed by disease. So, for instance, in 963 or 964 the army of the Emperor Otto I was attacked by a severe pestilence in Italy—a murderous disease which was usually fatal in twenty-four hours. The German army of Henry IV in 1081-2, but especially after the capture of Rome on June 3, 1083, suffered from plagues in Italy; but the same army fared even worse in 1084, when a plague broke out and carried away, for example, the entire German garrison in

¹ F. Schnurrer, *Chronik der Seuchen*. Tübingen, 1825. Vol. i, p. 38.—H. Brandeis, *Die Krankheit zu Athen nach Thukydides*. Stuttgart, 1845.—H. Häser, *Lehrbuch der Geschichte der Medizin und der epidemischen Krankheiten*. Third edition. Jena, 1882. Vol. iii, p. 4.—W. Ebstein, *Die Pest des Thukydides*. Stuttgart, 1893.—Also an article by the same author entitled *Die Pest des Thukydides* in the *Deutsche med. Wochenschrift*. No. 36. 1899.—F. Kanngiesser, *Über die Seuche des Thukydides*. *Prag. med. Wochenschrift*. No. 100. 1903.

² A. Laveran (note 1, introduct.), p. 653.—H. Häser, *op. cit.*, p. 24.

Rome. In 1137 Lothair's army was likewise attacked by infectious diseases in Italy. But by far the most devastating of all was the pestilence which broke out in Rome in August, 1167, shortly after the capture of the city by Frederick Barbarossa, and paved the way to a catastrophe which culminated in the complete annihilation of the German army. At that time many eminent men succumbed to the disease, the army dwindled away in the hands of the leaders, and the soldiers fled in vast numbers in order to escape certain death. Even after the Emperor Barbarossa's withdrawal from Rome the pestilence continued to rage in his army, and it was a long time before it disappeared from the city. It was the true (bubonic) plague, and usually resulted fatally on the first day. In the winter of 1190-1 a pestilence broke out in Lower Italy in the army of Henry VI; it appeared at the beginning of the siege of Naples and carried away many eminent men. The king himself contracted the disease, and had to be taken to Capua.³

The armies of the Crusades fared even worse; the mortality in the First Crusade, before and after the conquest of Antioch (1097-8), was terrible. The pestilence is said to have broken out first among the children and women who accompanied the armies, and its dissemination was favoured by a lack of sustenance and continual rainfall; from September to the 24th of November the pestilence carried away 100,000. The nature of the disease is not known although it is known to have been very infectious. When a new army of 1,500 Germans arrived, it was quickly attacked by the disease and in a few days almost completely annihilated. Several hundred frequently died in a single day, and as the summer of 1099 was very hot and a number of bodies remained unburied, the pestilence lasted well into that year. In 1100 another pestilence raged among the crusaders. Again, during

³ Information regarding pestilences that attacked German armies during campaigns into Italy is taken largely from a book by B. M. Lersch, entitled *Geschichte der Volksseuchen*. Berlin, 1890.

14 EPIDEMICS RESULTING FROM WARS

the Second Crusade a severe epidemic broke out in the army of the Emperor Louis VII at Attalia in Asia Minor ; the pestilence spread rapidly among the inhabitants of the city, so that many houses, even entire streets, were depopulated.⁴

During the Third Crusade, shortly after the death of Frederick Barbarossa (June, 1190), a severe pestilence broke out in the army that was besieging Antioch ; according to Michaux only 5,000 infantrymen and 700 cavalrymen survived out of the entire German army.⁵ At the siege of Acre (Ptolemais), which lasted from August 1189, to July 1191, there broke out in the winter of 1191 a terrible pestilence which played havoc in the pilgrim army ; it was caused by an inadequate supply of food, and its symptoms (enlargement of the limbs and falling out of the teeth) betoken scurvy. It also appeared in the army of Saladin, but was much worse in the Christian army, in which from 100 to 200 crusaders died every day. Duke Frederick of Swabia succumbed to this disease on January 20, 1191.⁶

At the time of the crusade against the heretics a serious pestilence broke out in Egypt in the army of the crusaders, which had already, on August 12, 1218, suffered from dysentery ; it appeared in December during the siege of Damietta, after a heavy and continuous downfall of rain. 'The patients', says Wilken, 'were suddenly seized with violent pains in the feet and ankles ; their gums became swollen, their teeth loose and useless, while their hips and shin bones first turned black and then putrefied. Finally, an easy and peaceful death, like a gentle sleep, put an end to their sufferings. A sixth of the pilgrim army was carried away by this disease, which no medicine could cure.'⁷ Only a few patients who survived the winter were helped to recovery by the warmth of spring. It was unquestionably

⁴ See B. M. Lersch (loc. cit.) for statements regarding the First and Second Crusades, pp. 80 and 85.

⁵ B. M. Lersch (loc. cit.), p. 90.

⁶ F. Wilken, *Geschichte der Kreuzzüge*. Leipzig, 1826. Vol. iv, p. 314.

⁷ Id., loc. cit., vol. vi, p. 222.

a severe form of scurvy. The besieged, too, suffered from the destructive pestilence, and also from Egyptian ophthalmia. We read further in Wilken: 'A horrible sight greeted the pilgrims when they took possession of Damietta. Not only the houses, but even the streets were filled with unburied corpses; in the beds dead bodies lay beside helpless and dying invalids, and the infection of the air was intolerable. Of 80,000 inhabitants which the city had had at the beginning of the siege only 3,000 were left, while only 100 of these were healthy.'⁸ Other reports say that 10,000 inhabitants survived.

In 1270, during the Seventh and last Crusade, which strangely enough passed by way of Tunis, a pestilential disease broke out in Carthage, carrying away, in addition to many soldiers and men of rank, King Louis IX of France himself and his son, Jean Tristan. This pestilence was dysentery, and it spread even to Sicily, whither the king's body was conveyed. After the king's death conditions were even worse, since so many people died that it was impossible to bury all the bodies. The disease also attacked the enemy's army.⁹

The increased prevalence of *leprosy* in Europe in the Middle Ages is often attributed to the Crusades.¹⁰ Leprosy was very widespread in Germany, France, Italy, and other countries of Europe before the Crusades; according to Hirsch it appeared in the Roman Empire in the first century before the birth of Christ, but did not become very prevalent until later. Legal regulations governing the marrying of lepers date back as far as the seventh century, while the earliest reports regarding leper-houses come down from the eighth and ninth centuries. Most leper-houses, however, were built between the eleventh and thirteenth centuries, and although the reverse opinion has been expressed, it is

⁸ F. Wilken, *Geschichte der Kreuzzüge*. Leipzig, 1826. Vol. vi, p. 200.

⁹ Id., loc. cit., vol. vii, p. 561 ff.

¹⁰ A. Hirsch, *Handbuch der historisch-geographischen Pathologie*. Second edition, 1881. Vol. ii, p. 4.—H. Schwiening, op. cit., p. 692.

nevertheless improbable that the building of these houses was not due to the increased prevalence of the disease. Inasmuch as leprosy was very widespread in the Orient, where numerous crusaders contracted it, as indicated by the fact that institutions were founded there for its victims, many crusaders doubtless returned with the disease in their systems. But regarding this matter we shall never have absolutely reliable information ; for it is assumed that many people suffering from other chronic skin diseases were placed in the leper-houses. A careful study of the available data, however, leads us to believe that wrong diagnoses were not so frequent as to account for the large number of cases of leprosy in the eleventh, twelfth, and thirteenth centuries. Admittance to leper-houses was regulated by many precautionary measures, and the diagnosis of the disease was made by churchmen, even bishops, who without doubt necessarily acquired a good eye for the disease in the course of time. Not until later, when we may be certain that leprosy was no longer brought from the Orient, was the disease probably now and then confused with syphilis.

The notable pandemic outbreak of syphilis at the end of the fifteenth century was also largely attributable to warlike events. The rapid spread of the disease throughout Central Europe was due, according to contemporary notices, to the *Landsknechte* (common foot-soldiers). The rough coincidence of this epidemic with the discovery of America has given rise to the view that the disease did not exist in Europe at earlier periods, but was borne thither from America. But we can point to numerous instances in the course of the last century, of how infectious diseases, hitherto unknown, or existing only sporadically, all of a sudden became pandemic (cholera, plague, diphtheria, influenza), although no satisfactory and comprehensive explanation of the phenomenon has been offered. It is generally known that infectious diseases break out in a mild form and last for years, and then suddenly change their character and cause virulent epidemics ;

this is positively confirmed by the epidemic of small-pox in 1870-2, which will be discussed later. At all events we cannot draw the conclusion from the sudden outbreak of an epidemic of syphilis, that the disease was not present in Europe before.

A serious epidemic of syphilis broke out in the army of Charles VIII of France during his expedition to Naples. Inasmuch as his advance was nowhere opposed, he was able to enter Naples on February 12, 1495. There the French army gave itself over to the most unbridled licentiousness, and the result was that the disease spread rapidly in both the French and Italian armies. Italians and Frenchmen accused each other of having brought the disease, so that the former called syphilis 'French disease' and the later 'Neapolitan disease'. The disbanding of Charles's army caused the disease to spread far and wide in Europe. 'Those who had most to do with the further dissemination of the disease,' says Häser,¹¹ 'were the Albanian and Roumanian estradiots serving in the Venetian army, brutal and rapacious adventurers, and also the German and Swiss *Landsknechte* returning from Italy, who spread the disease over a large part of Europe.'

A large number of writers of the beginning of the sixteenth century bear witness to the fact that the pestilence was borne into Germany by *Landsknechte*; e.g. Pastor N. Berler (*Ruffachische Chronik* of 1510), Heinrich Brennwald (1519), Johann Haselbergk (1533), Valentin Müntzer (1550), *Nuremberg Chronicle* of 1580.¹² In the year 1495 the pestilence broke out in many places in France and Germany; in Strassburg, for example, the disease was planted by *Landsknechte* who had served in, and been discharged from, the army of Charles VIII; Hans Schott testifies to this fact in his *Weltlich Leyenbuch* (Strassburg, 1541). The city of Metz tried in vain to ward off the disease; according to the

¹¹ H. Häser, op. cit., p. 256.

¹² H. Fuchs, *Die ältesten Schriftsteller über die Lustseuche in Deutschland*. Göttingen, 1843. P. 436.—J. F. C. Hecker, *Die grossen Volkskrankheiten des Mittelalters*. Berlin, 1865. P. 218.

Metz Chronicle, many Burgundians (500 cavalrymen and 700 infantrymen) came to Metz in May 1495, and since the most of them were suffering from *mal de Naples*, they were not allowed to enter the city. But the soldiers infected the women in the vicinity, and the disease was later borne by them into the city, where it prevailed for four years, not beginning to abate until the year 1500.¹³ We also have testimony to the fact that the outbreak of the disease in Nördlingen (1495) was caused by the arrival of *Landsknechte*.

In a supplementary way we may add here that later wars also caused frequent epidemics of syphilis within narrow confines; instances of this kind are cited by A. Hirsch¹⁴ and H. Schwiening.¹⁵

In August of the year 1486 *English sweating-sickness* appeared in England for the first time; it broke out among the troops of Henry VII shortly before his victory at Bosworth on August 22, 1486. And when Henry landed at Milford the disease spread, carrying away many victims wherever it went. 'Strong and well-nourished people were particularly susceptible to it—more so than old men, children, and poor people. From three to nine, sometimes all the inmates of a house caught it, and it gradually spread over half the inhabitants of the town. The first appearance of the disease is said to have caused more devastation in London (where it broke out on September 21), Bedford, and Cambridge, than the sword, which had been ruling for thirty years in a fearful civil war. According to Forest, an incredible number of people died from it, while Thomas Moore also speaks of the dangerous character of this epidemic. In many places a third of the inhabitants are said to have died from it, scarcely one in a hundred of its victims recovering.'¹⁶ The

¹³ F. Maréchal et J. Didion, *Tableau historique, chronologique et médical des maladies endémiques, épidémiques et contagieuses qui ont régné à Metz et dans le Pays-Messin*. Metz, 1850 and 1861. P. 116.

¹⁴ H. Hirsch (note 10, Chapter II), vol. ii, p. 62.

¹⁵ H. Schwiening (note 1, Introduction), p. 694.

¹⁶ B. M. Lersch (note 3, Chapter II), p. 197.

subsequent appearance of the disease, especially the transplantation of it to the continent in the year 1529, was not attributable to warlike events. In the year 1551 it disappeared as suddenly as it had appeared in 1486.

The disease usually began with a chill, headache, palpitation of the heart, difficulty in breathing, and later a profuse, very malodorous emission of sweat from all parts of the body. The patient quickly lapsed into a state of lethargy. The progress of the disease was uncommonly rapid; 'in one day either the disease or the patient came to an end,' says Fracastorius. Any patient who did not succumb, recovered completely after one or two weeks.

From the sixteenth century on notices are more abundant; we now hear of epidemics of typhus fever throughout all Europe, although we do not know positively where the disease first appeared. 'At all times,' says Hirsch,¹⁷ 'as far back as historical investigation is able to follow the course of typhus fever at all, the disease has always been bound up with the most dismal calamities of the nations. The supposition is therefore justified that, in the numerous war-pestilences and famine-pestilences of antiquity and the Middle Ages, regarding which we have no medical reports and must rely only upon the chronicles, typhus fever has played a conspicuous role.' By this, however, Hirsch does not mean to say that the specific disease in all the so-called war-pestilences was typhus fever; on the contrary, he adds: 'In saying this I by no means wish to imply that I always identify "war-pestilences" and "famine-pestilences" with epidemics of typhus fever; those pestilences, appearing at epochs of general misery, for the most part represent a mixture of diseases, especially catarrh of the stomach, dysentery, scurvy, typhus fever, and frequently malaria and typhoid fever, which not only by chroniclers, but also by medical statisticians, have quite often been lumped together as

¹⁷ H. Hirsch (note 10, Chapter II), vol. i, p. 385. Hirsch uses the word typhus for typhus fever.

one disease. It is to-day almost impossible to analyse these accounts, in which we can distinguish only individual characteristics of those various diseases. This appears most distinctly in the reports of the chroniclers and historians regarding the war pestilences and famine pestilences of antiquity, and it also explains the futile effort of the historians to reduce to one disease known to us the numerous and complicated symptoms which they have looked upon as the expression of a single disease-process—an effort which has led some of them to the somewhat extravagant conclusion, that they were diseases which are now extinct. The same backwardness, furthermore, characterizes—though to a lesser extent—the descriptions which the physicians of the seventeenth and eighteenth centuries wrote of the epidemics of ‘putrid fever’, ‘bilious fever’, and ‘mucous fever’ occurring at that time. Here, too, in many cases it was evidently a question of the simultaneous outbreak of various diseases, the nature of which even the most expert critic could not afterwards determine with certainty.

At the end of the fifteenth century typhus fever was prevalent in many parts of Europe; the first scientific account of it comes from the pen of Fracastorius, who had an opportunity to observe the disease during the epidemics in Italy in 1505–8, and who described it as a disease indigenous to Cyprus and the neighbouring islands and appearing for the first time in Italy.

The names given to the disease were numerous and cannot all be mentioned here; the name ‘Hauptweh’ (headache) or ‘Hauptkrankheit’ (head-disease) was current in Germany, while the additional words ‘ohne Sterbedrüsen’ (without death glands) expressly distinguish the disease from bubonic plague. T. von Györy¹⁸ mentions a large number of synonyms—Hungarian disease, lazaret fever, spotted fever, petechial disease, &c.

In 1490 the disease was borne by Spanish soldiers, who had

¹⁸ Tiberius von Györy, *Morbus hungaricus*. Jena, 1901. P. 146.

fought in the Venetian army against Turkey, from Cyprus to Spain, and during the war of Ferdinand the Catholic against the Moors it spread to Granada and did more damage to the Spanish army than the swords of the Moors.¹⁹

In the year 1490 a serious epidemic broke out in Lorraine, which Maréchal and Didion²⁰ think was typhus fever; it appeared in that bitter and indescribably cruel conflict between René, Duke of Lorraine, and the people of Metz. Despite the armistice proclaimed on June 18, the pestilence spread far and wide and in August entered Metz, compelling the inhabitants to take to flight; the nobles retired to their castles and the citizens went out into the country. And although the city was strictly quarantined, the disease spread throughout Lorraine and northern Alsace.

In the year 1528 an epidemic of typhus fever occurred in connexion with warlike events. This pestilence broke out in Upper Italy and spread to Lower Italy, where a war was going on between French troops on the one side and German and Spanish troops on the other. The loss of human life was uncommonly large, 30,000 French soldiers and twice as many non-belligerent inhabitants are said to have died. And the pestilence was also borne from Italy to Germany.

Well known in history is the great pestilence which in 1552 forced Emperor Charles V to raise the siege of Metz, which had been going on for two months (November and December). Maréchal gives us detailed information about this;²¹ the Emperor's army, he says, which consisted of 80,000 German, Spanish, and Italian troops, in addition to the enormous camp-following that always accompanied armies at that time, was reduced one-third by the end of December through desertion, disease, and disablement. According to the report of the Venetian physician, Andreas

¹⁹ J. A. F. Ozanam, *Histoire médicale, générale et particulière des maladies épidémiques, contagieuses et épizootiques*. Paris and Lyons, 1823. Vol. iv, p. 157.—F. Schnurrer, *op. cit.*, vol. ii, p. 27.

²⁰ Maréchal et Didion, *op. cit.*, p. 89.

²¹ *Ibid.*, p. 150.

Gratiolo, the widespread diseases were typhus fever and dysentery. The appearance of these diseases was favoured by the congregating of such enormous numbers of people in tents and inadequate places of shelter, and also by the great dampness and the lack of the necessities of life. The extreme cold, which prevented the dispersion and isolation of the patients, also favoured the dissemination of the disease. More than 200 men died in the barracks every day, while 10,000 men, all told, are said to have succumbed. It was also observed that the Spaniards and Italians suffered more than the *Landaknechte* and other German troops, since they could not stand the severity of the climate so well. During the siege, hospital-fever and scurvy raged in the city itself, and after the siege was raised, in the night of January 1, 1553, typhus fever broke out there, having been borne into the hospitals by wounded soldiers from the enemy's camp, or else brought back by citizens who had been out to inspect the position of the besiegers. During the siege the surrounding country had been most terribly ravaged by the enemy's soldiers, so that the inhabitants were in the greatest misery, without food and without any source of help. For the spread of typhus fever this afforded a very favourable soil, and it raged furiously in the months of June and July in the villages surrounding Metz.

The battles with the Turks in the east did a great deal toward spreading typhus fever throughout Europe; for that reason the name 'Hungarian disease' came into existence. Toward the end of the fifteenth century, hitherto prosperous Hungary, by endless wars with Turkey and by international strife, was brought to the very verge of ruin. Agriculture ceased almost entirely, the development of the country came to a standstill, large tracts of land, such as the Banat region, assumed the appearance of a vast swamp, while at the same time the alternate cold nights and hot days, together with the great dampness, were very unhealthy for the foreign soldiers, who were not accustomed to such

a climate. Partly this, and partly the utter lack of sanitation, increased the baneful effects of camp-life. Dirt and refuse accumulated in heaps, vermin multiplied so rapidly that it was impossible to get rid of them, corpses were inadequately buried, while enormous numbers of flies and gnats molested the soldiers and did a great deal toward spreading infectious diseases. The hospitals were in a pitiable condition, and since the soldiers, after their previous experiences, had little hope of leaving the country alive, they gave themselves over to a most dissolute life, in consequence of which the country suffered terribly. Several contemporaries bear witness to the fact that a large part of the German troops never once faced the enemy, for the reason that they succumbed beforehand to 'Hungarian disease', which killed more of them than the swords of the Turks. Hence Hungary was called at that time the 'Cemetery of the Germans'.

'Hungarian disease' was typhus fever, which manifested certain unusual characteristics for the reason that the German troops, being unaccustomed to the local foods, inclined considerably toward intestinal catarrh and scurvy, while many of them also suffered from malaria, which weakened their power of resistance. The sudden beginning with a chill, the appearance of lenticular spots on the fourth, fifth, or sixth day, the duration of about fourteen days, the sudden fall of temperature—all these symptoms, mentioned by witnesses, definitely stamp the disease as typhus fever. If the disease has been identified by many historians with bubonic plague, the reason is that in serious cases of typhus fever suppuration of the salivary glands, gangrene of the lower extremities, of the nose and ears, &c., are not infrequent occurrences.

According to Györy,²³ the pestilence which raged so furiously in the army of Joachim, Margrave of Brandenburg, when the latter was in Hungary in 1542, was typhus fever. He assumes that the disease was borne thither by the

²³ Györy, *op. cit.*, p. 145.

Italian troops which the Pope had sent to help fight against the Turks, although he cannot base his assumption on any argument save that typhus fever was no rare disease in Italy. It is much more probable, however, that the disease was already endemic in Hungary at that time, whether from of yore, or whether the Turks had brought it there. So much, however, is certain, that the Germans suffered a great deal more from it than did the Hungarians and Turks, who had probably already survived attacks of the disease and had thus become immune.

'Hungarian disease' acquired greater importance in the year 1566, when it spread from Hungary over a large part of Europe. It was then that this name first came into fashion. According to Thomas Jordanus, who took part in the expedition, the disease broke out on the island of Komorn during the war of Maximilian II against the Turks; from there it spread further west and forced the Emperor to conclude a treaty of peace which favoured the Turks. After the dispersion of the army the discharged soldiers carried the disease in all directions.²³ Vienna was hit very hard; not only separate houses, but also entire streets, were filled with victims of the disease. The returning Italians brought the disease first to Carinthia, where it broke out severely in Villach, and then to Italy. In the year 1567 the pestilence carried away 400 people in the little town of Villach, and from there it spread to Styria. In the same way it was carried to Bohemia, Germany, Burgundy, Belgium, and Spain.

At the end of the sixteenth century typhus fever appeared in Hungary with renewed virulence; during the siege of Papa it raged with particular severity among the Italian troops, and according to Coberus all the patients in the field-hospital died.

²³ Györy, *op. cit.*, p. 143.—F. Schnurrer, *op. cit.*, vol. ii, p. 112.

CHAPTER III

THE THIRTY YEARS' WAR

At the beginning of the seventeenth century, epidemics of bubonic plague and typhus fever were frequent occurrences in various parts of Central Europe, but they were usually kept localized by the strict measures that were adopted, in accordance with the best scientific knowledge of the time, to prevent them from spreading; the houses in which the patients lay were quarantined, strangers from infected places were forbidden to enter the cities under penalty of death, the clothes and beds used by the patients were burned, while in the streets and public squares fumigations took place. But in the storm and stress of the Thirty Years' War such precautions could be taken only to a limited extent, and even when they were energetically carried out, they did no good, since diseases were so frequently borne from place to place. A further consequence of the long war was famine, which was caused by the devastation of the fields and the non-cultivation of the land, due to the lack of workers. This made it easier for pestilences to become unusually widespread throughout Germany. The fact that the scene of the war kept changing was also to a great extent responsible for the gradual dissemination of various diseases, since the regions in which the fighting was going on were always particularly exposed to pestilential devastation.

Unfortunately we possess, for the various pestilences, scarcely any accounts written by physicians, and with a few exceptions must rely upon the information given by chroniclers. In most cases, therefore, it is impossible to state with certainty just what the individual diseases were. Consequently, inasmuch as the word 'plague' is used in the chronicles for any serious pestilence, we have adopted

it in this same general sense in our account, without necessarily meaning thereby bubonic plague. Certainly one of the most common 'war diseases' at that time was typhus fever, and diseases that were commonly called 'burning, virulent fever', 'plague', 'head-disease', 'Hungarian disease', and 'Swedish disease', were undoubtedly nothing else but that. At the same time real plague, bubonic plague, now and then occurred, and the word 'plague' is thus very often used in its proper sense especially in reference to the pestilences of the years 1630-6. 'In the history of this calamitous war,' says Seitz,¹ 'we see typhus fever like a malignant spectre hovering over the armies wherever they go, in their camps, on their marches, and in their permanent quarters, and preparing an inglorious end for thousands of valiant warriors. Its ravages among the non-belligerent population in town and country caused the inhabitants of many provinces to remember with hatred and loathing the departed soldiers who were usually accused of having planted the seed of death.'

In general one may say that before 1630 the specific disease was usually typhus fever, and that after 1630 bubonic plague spread along with this disease throughout Germany; the death statistics of the larger cities, adduced at the end of this chapter, lead us to this conclusion. In addition to these two diseases, we find frequent mention of dysentery, scurvy, and, toward the end of the war, small-pox.

Innumerable articles, chronicles, &c., have described in detail the miserable condition of the German countries during the Thirty Years' War. The following account is largely based upon a notable work by a physician named Lammert, who offers us a chronological enumeration of the pestilences of that time, and also an exhaustive bibliography.² Since

¹ F. Seitz, *Der Typhus, vorzüglich nach seinem Vorkommen in Bayern geschildert*. Erlangen, 1847. P. 55.

² G. Lammert, *Geschichte der Seuchen-, Hungers- und Kriegsnot zur Zeit des Dreissigjährigen Krieges*. Wiesbaden, 1890.

it is impossible to discuss here thoroughly all the countless epidemics that occurred, we can merely point out their main features and indicate their connexion with warlike events. The figures quoted may be relied upon, if, as is usually the case, they are taken from church-registers; as regards statements taken from chronicles, on the other hand, there is more occasion for distrust. For a correct understanding of the facts, to be sure, we should have to know the exact population of the cities and towns, and this information is only in rare instances available. We must bear in mind, furthermore, that the country-people fled to the cities when armies were approaching, and also that nearly all cities were surrounded by walls and embankments.

The war began in Bohemia. After the battle on White Hill, near Prague (November 8, 1620), the soldiers of Count Mansfeld, who were already infected with typhus fever, marched down the Main to the Palatinate and to Alsace, devastating the country as they passed and leaving severe pestilences behind them. In the year 1625 the main scene of the war was transferred to the north, where numerous epidemics had already broken out in the course of that year. The disorder caused by the war, and especially the wild warfare of Wallenstein, who in the fall of 1625, after mustering his army, had joined forces with Tilly, were particularly favourable to the spreading of disease. Hence in the years 1625-6 we see precisely in North Germany the 'plague' doing the greatest damage.

The battle of Barenberg (near Lutter, August 1626) gave the Imperialists the upper hand in North Germany. This ascendancy was taken away from them, however, with the appearance of Gustavus Adolphus of Sweden, who won a complete victory over Tilly in the battle of Breitenfeld (September 17, 1631). After that, Gustavus Adolphus advanced to the Lower Main (Frankfurt and Mayence), and the following year carried the war into Bavaria, which now became the principal scene of the fighting. After the battle

of Nördlingen (September 7, 1634), the fugitive Swedish Protestant army, pursued by the Imperialists, retreated through Württemberg, Baden, and Hesse to the Rhine, where the war was now carried on for several years. Both armies were badly infected with disease, and spread pestilence wherever they went. After the battle of Nördlingen the war became decentralized, splitting up into a number of warlike movements throughout all Germany; and everywhere these movements occurred they added, if possible, to the misery of the people.

In the year 1631 that terrible epoch of plague began which reached its climax in the years 1634-5 and lasted well into the following year. Its widespread character was due to the innumerable plundering and devastating marches of the Protestant-Swedish and Imperialist-Catholic armies back and forth across the country, and also to the consequent famine. Everything the brutalized soldiers could not consume themselves or take with them, they destroyed or burned. There was an absolute dearth of farm-workers, and in addition to that, the year 1635 was dry and unproductive. Horrible are the descriptions of the hunger and misery which the people in all parts of Germany experienced at that time. Under such conditions pestilences could spread unhindered; to be sure, they relaxed a little after the year 1638, but by no means ceased entirely. Whenever real plague disappeared, typhus fever, which was prevalent in all parts of the army took its place; and thus diseases were borne from place to place until the very end of that disastrous war.

I. THE WAR IN BOHEMIA AND THE PALATINATE (1618-24)

The year 1620 saw the first warlike events of any importance; at the beginning they were confined to Bohemia, where in November 1619, Frederick, Elector of the Palatinate, had been crowned King of Bohemia. In the first part of the year 1620 typhus fever broke out in Austria

and Bohemia among the poorly nourished troops of the Catholic League, carrying away, it is said, 20,000 Bavarian soldiers. After the League's successful battle on White Hill (November 8, 1620), the disease was borne by Bavarian soldiers back to Upper Bavaria and Württemberg; it is stated that it caused an eruption of red spots over the entire body, and that headache, dizziness, and stupefaction were prevailing symptoms.³ Munich, by adopting strict measures of precaution—isolation of the patients in houses outside of the city, disinfection of suspected effects and incoming letters, washing in vinegar of money sent in from infected localities—managed to exclude the disease from the city limits. In 1620 the troops of Count Mansfeld conveyed the disease, which was called 'head-disease', to Franconia, where in the following year it raged extensively. In consequence of their marauding expeditions, typhus fever also became very widespread in the Upper Palatinate—Neumarkt and Weiden are mentioned as places where it appeared; in Weiden 250 persons died, three or four times as many as in normal years. Count Mansfeld then marched down the Main and along the Neckar to Mannheim, and everywhere his soldiers went they left behind them the germ of typhus fever: e. g. in Boxberg (near Mergentheim), in Neckarelz (near Mosbach), in Eberbach, in Ladenburg and Viernheim (both near Mannheim), and in many other places.

In the following year Lorraine, the Palatinate, and northern Baden became the scenes of Count Mansfeld's predatory incursions. Since the country-people fled to the cities the latter became greatly overcrowded; in Strassburg, for example, whither 23,000 country-people had sought refuge, a severe pestilence (chiefly dysentery) broke out and carried away in the course of that year (1622) 4,388 people. 'Head-

³ J. C. Rhumelius, *Historia morbi, qui ex castris ad rostra, et a rostris ad aras et focos in Palatinatu Bavariae superioris penetravit, anno 1621, et permansit annos 1622 et 1623*. Quoted from Ch. Boersch in his *Essai sur la mortalité à Strassbourg*, 1836, p. 138.

disease' broke out in Wimpfen-on-the-Neckar, after the battle fought there on May 6, in consequence of the arrival of over 900 hundred sick and wounded soldiers; the result was that a large proportion of the inhabitants were taken sick, and a third of them died. In the Palatinate, through which Mansfeld passed on one of his predatory raids, the mortality in town and country, in consequence of dysentery and other diseases, was very great. Again, in Frankfurt-on-the-Main typhus fever broke out in 1622, and 1,785 people died (as compared with 600-700 in normal years). In Mayence and vicinity the disease became very widespread in the year 1624. A plague also broke out in Nuremberg in October 1624, carrying away 2,487 people that year, and 2,881 the following year.

The Palatinate suffered terribly in the year 1623 from the continued marauding of Mansfeld's army, and in consequence of cross-marches of Spanish and Walloon troops pestilential diseases were conveyed from there to Lorraine. In July 1623, according to Maréchal and Didion,⁴ typhus fever or bubonic plague broke out in the village of Lessy and raged furiously for two months. Despite energetic measures that were taken to prevent the disease from spreading, neighbouring and even more or less remote villages were infected, so that in 1624 the entire country was suffering. In spite of the fact that all strangers were forbidden to enter the city of Metz under penalty of death, the disease made its appearance there in May 1625, and in less than ten months carried away 3,000 people. Of the cities surrounding Metz, all of which were infected, Verdun had a particularly high mortality. The epidemic spread from the Palatinate to Württemberg, Baden, Hanau, Nassau, and down the Rhine; for the most part it was typhus fever.

In the year 1623 the army of the Catholic League spread infectious diseases throughout Hesse, particularly in the region of the Werra. When the army withdrew, it left

⁴ Maréchal et Didion, *op. cit.*, p. 174.

dysentery behind it, for example, in Witzenhausen, Eschwege, and Hersfeld; in July and August it carried away many victims. A pestilential disease broke out on June 3, 1624, in Hersfeld, carrying away from October 4, 1624, to January 1625, 316 persons. In 1625, 'hunger typhus' and bubonic plague appeared in Nassau; the pestilence began in Dillenburg on December 18, 1625, and lasted until October 30, 1626, carrying away in this time 378 people—about one-third of the population. The climax of the pestilence came in July. A plague also broke out among the soldiers in Walsdorf-on-the-Ems, likewise in Idstein, remaining there for several years.

II. THE WAR IN SAXONY, THURINGIA, BRANDENBURG, AND POMERANIA (1625-30)

The years 1625 and 1626 were bad pest-years; according to Lammert, the various epidemics that occurred were partly typhus fever, partly bubonic plague, and partly dysentery. The pestilences spread over Saxony, Thuringia, Silesia, Eastern Prussia, Posen, Poland, and Moravia, and carried away large numbers of people. They were not always directly connected with warlike events, as shown by the fact that many provinces that were spared by the war were attacked by the diseases. On the other hand, the incursion of Wallenstein's troops into Saxony and Thuringia caused pestilence to become unusually widespread.

From 1625 to the time of the battle of Breitenfeld (1631) Saxony suffered terribly from pestilences that were caused and prolonged by the war, though by no means as terribly as in the years 1631-3. Dresden and Leipzig, comparatively speaking, were but slightly affected. Of 13,000 inhabitants that Dresden had in the year 1626, 341 succumbed to a plague which began in April and disappeared in December; the disease was called 'burning fever', spotted fever',

and 'pestilential spotted fever', while in the records of the town council we find mention of 'spots, often the size of a groschen, all over the body', and also of 'swellings'. Inasmuch as abscesses and gangrene are often observed in cases of typhus fever, it seems likely that it was that disease.⁵ Of 14,500 inhabitants in Leipzig only 122 succumbed to it, although houses in all the streets were infected. Here again, accordingly, we see how slight the danger to life is in the case of typhus fever.

The western part of the present kingdom of Saxony suffered considerably more than the eastern part. In the year 1625 plagues broke out in the cities of Plauen, Reichenbach (1,000 deaths), and Zwickau; the last-named city was revisited in June 1626, and between then and the end of the year 216 people died there. Pestilence also broke out in the vicinity of Leipzig in 1626—in Borna (70 deaths), in Grimma (350 deaths), and in Wurzen, where it appeared in August. The following places nearer Dresden were also the scenes of plagues that year: Rosswein (near Döbeln—376 deaths), Mitweida (outbreak on April 9, 1626—number of deaths before that day 22, between that day and the end of the year, 1,000), Frankenberg (581 deaths), Freiberg (752 deaths in the year 1626—500 of them due to the plague). The village of Dohna, south of Dresden, is also mentioned; in the year 1626 there were 157 deaths there, as compared with an average annual mortality of 60. In the Erzgebirge plagues appeared in various places in the year 1625; 134 people died in Annaberg and 323 people in Zöblitz. In 1626 there were 205 deaths in Schwarzenberg, 178 deaths in Gottesgabe, and 81 deaths in Breitenbrunn. Two towns in eastern Saxony, Bischofswerda and Zittau, are also mentioned; there were 182 deaths in the former in the year 1625.

All Thuringia suffered severely from pestilences in the years 1625-6. In the year 1625 the number of deaths in

⁵ E. J. J. Meyer, *Versuch einer medizinischen Topographie und Statistik der Haupt- und Residenzstadt Dresden*. Stolberg and Leipzig, 1840. P. 122.

Eisenach had increased to 315, while in 1626 a plague raged so murderously that 769 persons succumbed to it; other reports say 2,500, but this number doubtless includes the refugees. In the following year the number of deaths decreased to 156. In Ruhla, a neighbouring village, 98 persons succumbed to the plague. In many Thuringian cities the epidemic had already secured a foothold in the year 1625, and was then spread over a very large territory by Wallenstein's invasion. Schmalkalden was the scene of a plague from June to August, 1625, and in Gotha one broke out at the end of July, 1625, carrying away 722 persons that year and 209 the following year. In Erfurt, which had some 15,000 inhabitants, 3,474 people are said to have succumbed to a plague in the year 1626, the strict ordinances passed by the town council on December 25, 1625, being of no avail. The small communities and cities lying to the north of Erfurt, according to the reports, were very severely attacked; in the year 1625 Ballstädt, with a population of 600, lost 365, while in the year 1626 the number of deaths in Gräfen-tonna was 510, in Gebesee 275, in Kindelbrück 1,514, in Straussfurth 367, in Weissensee 500, and Cölleda 1,000. In the region south of Erfurt the village of Ohrdruf lost 203 inhabitants in the year 1625, and 143 in the following year. In Arnstadt 1,236 people succumbed in 1625 to 'head-disease' and bubonic plague—a number corresponding to one-quarter of the population. Gräfenroda had 1,630 deaths in the year 1625, and Tambach 400 deaths in 1626. Koburg and Rudolstadt were also visited by a plague in 1626, while towns in the vicinity of the latter, Königssee, Schwarza, Tanna, and Schleiz, had 707, 129, 195, and 181 deaths respectively. The neighbouring town of Pössnek in the year 1625 had already lost 1,000 inhabitants. Jena and Weimar both suffered, while there were 228 deaths in Gera and 1,100 deaths in Zeitz due to pestilence. Many other places in Thuringia that suffered from plagues are not mentioned here.

That part of Saxony which corresponds to the modern province of Saxony fared in much the same way as Thuringia, while those parts bordering directly on the kingdom of Saxony were relatively less severely attacked. A plague broke out in Eilenburg in September 1625, and carried away many persons there and in the surrounding country. At Delitsch (west of Eilenburg) a dangerous fever (*febris maligna*—probably typhus fever) spread through the wandering armies, and before the beginning of autumn carried away 150 persons. In the winter the disease subsided a little, but broke out again in June 1626, and carried away 880 people—in September alone there were 229 deaths, and numerous families were completely wiped out. A plague also raged in the vicinity of Halle; not until the following year, however, did it break out in the city itself, whither it was borne by Imperialist soldiers, and where it caused, from June to December, 3,400 deaths. In Eisleben (east of Halle) a plague began in May 1626, and carried away 30 to 50 people daily, so that the total number of deaths for the year was 3,068. Merseburg lost 341 inhabitants in the year 1626, and a plague raged in Naumburg in the years 1625-6. The town of Querfurt (west of Merseburg) in 1625 was for seven weeks the quarters of 3,000 of Wallenstein's soldiers; they brought dysentery with them, and the result was that 200 citizens died. In the second half of the following year a plague broke out and carried away 1,400 inhabitants of the city (including 200 soldiers) and numerous inhabitants of the surrounding country. The town and vicinity of Sangershausen were also severely attacked; the pestilence began in the town in June 1626, and reached its climax in September with 570 deaths—1,323 deaths, all told, are recorded in the church register for that year, but the figure is said to be too small. Lammert mentions sixteen surrounding villages in which a total of 2,960 deaths occurred in the year 1626. In Sondershausen 54 people died up to the end of July of that year, 36 in August, 137 in September, and 143

in October; the mortality then decreased, but not until 466 persons had died, 400 of them in consequence of the plague. In the near-by towns of Frankenhäusen and Langensalza the number of deaths was 915 and 913 respectively, the latter town having been visited by a plague the year before. Nordhausen, from January 1, 1626, to December 6, 1626, lost 3,283 inhabitants—2,504 natives and 779 refugees from other places. In Stolberg (north-east of Nordhausen) a plague broke out on June 27, 1626, and caused 623 deaths. Quedlinburg, Aschersleben, and Halberstadt were also attacked; in Aschersleben a plague broke out on June 15, 1625, and between then and the end of the year carried away 157 persons. The total number of deaths in the year 1625 was 534, in the following year 1,800 (1,066 in consequence of the plague), not including the soldiers; the years 1627-9 had a remarkably low mortality. In 1626 a plague carried away 549 persons in Gröningen (near Halberstadt). The cities on the Elbe and the surrounding country were severely attacked; a pestilence broke out in Dessau on September 3, 1625, and between then and the end of the year 224 persons were buried—399 in the entire year. The disease reappeared in the summer of the following year, having caused 662 deaths, while only 39 died in the year following. In Aiken-on-the-Elbe (below Dessau) 1,000 persons, including soldiers, succumbed to a plague in the year 1626. In the cities on the Saale, above its confluence with the Elbe, a plague raged furiously; in Bernburg it appeared in the second half of the year 1625, carrying away 1,340 persons in that year (the number of deaths in the following year being 425); Kalbe was also severely attacked. A plague broke out in Magdeburg at the end of June 1625, and lasted well into the next year; the wealthy citizens fled from the city, but were compelled to return by the approach of the Imperialists, and the result was that several thousand inhabitants died. The country to the south-west of Magdeburg, as far as Bode, suffered severely—Osterwed-

dingen, Wanzleben, Gross-Salze, Förderstedt, Egeln, Wolmirsleben, and other places. Several soldiers quartered in Förderstedt had succumbed to a plague in June and July 1626, and had infected the citizens with the disease, which carried away 155 of them. A plague broke out in Egeln in October 1625, and reached its climax in February 1626; from January until August 16 of that year 296 persons died there. In Unseberg, which had been infected in August 1625, some 400 citizens and soldiers were buried in the year 1626, in addition to many who were secretly buried in gardens, thickets, and fields. The plague raged with particular fury in August 1626; in Volmirstadt 246 persons died between July 6 and October 1626—144 in September alone.

In Lower Saxony, in the region between the Elbe and the Weser, most of which to-day belongs to Hanover, a plague raged virulently in the years 1625-7. In Osterode, whither numerous country people had fled from the approaching war, a very severe pestilence broke out; in the Saint Aegidius community alone 1,500 persons died, among them many outsiders. In Klausthal 1,350, in Andreasberg 700, in Einbeck 3,000, and in Hameln 1,143 people succumbed to bubonic plague and 'head disease'. In Goslar, where the pestilence had appeared in 1625, conditions were rendered particularly bad by the fact that many wounded Imperialists were brought there after the battle of Barenberg (near Lutter—August 27, 1626); most of these soldiers died there, 3,000 deaths due to pestilence having occurred in Goslar in the years 1625-6. Wallenstein's soldiers also brought pestilence with them to Helmstedt (in the region of Brunswick); here one-third of the citizens died, and 295 houses were rendered tenantless. The university faculty fled several times to Brunswick, the students either going home or enlisting in the army. This plague did not come to an end for two years. The surrounding villages, furthermore, were severely attacked by it; during the siege of Göttingen by

Tilly (June to August 12, 1626) it became very widespread, since the city was overcrowded with fugitives. From 50 to 60 persons were buried every day. In near-by Dransfeld 700 people died, in Wolfenbüttel 1,705. In Hanover, where a plague had already broken out in the year 1625, a reappearance of it in March 1626 drove out the garrison. The severity of this plague, which carried away 3,000 people, was increased by the numerous fugitives in the city; about one-third of the population survived. In the city of Nienburg, which was besieged by the Imperialists after the battle of Barenberg, a pestilence likewise broke out among the inhabitants and in the garrison. In Lüneburg it lasted from 1625 to 1628, and in Osnabrück from August 1625 to the end of the year.

In the years 1625-6 Wallenstein's soldiers carried pestilence into the region north of Magdeburg; in Rathdensen 76 persons were carried away between the end of August and the first of the year, not including those who were buried secretly. The following year it demanded a considerably larger number of victims—583; the maximum was in June—147. In the Altmark (north-eastern part of the province of Saxony) dysentery, bubonic plague, and typhus fever broke out almost everywhere during the years 1625-8. Dysentery appeared in the Danish garrison at Tangermünde and carried away 1,600 people, and on June 29, 1626, the Danes withdrew from the place. Stendal was also visited by a plague after the departure of the Danes; it broke out in July, and in a few months caused 2,511 deaths, the normal mortality being 280-290. Numerous bodies were secretly buried, while many peasants who had fled to the city were among the dead; thus the total number of deaths was estimated at 5,000. In Osterburg 624 people died in the years 1626-8, and in Bismark 163 persons died in the year 1626. In the city of Havelberg 668 persons succumbed to dysentery, 'head-disease', and bubonic plague, the latter alone carrying away about 400. A pestilence was conveyed

to Gardenlegen by the soldiers of Count George of Brunswick, who had his head-quarters there; the number of deaths there in the year 1626 amounted to no less than 1,514. In Salzwedel 335 persons died in the year 1625, and 451 in the following year, the plague being responsible for 400 of the latter. In Seehausen dysentery first appeared, and soon gave way to 'war-plague' (typhus fever), which lasted until 1628; some 200 of the soldiers quartered there died, and as many as 1,100 inhabitants.

Brandenburg also suffered, particularly in the south-eastern part, when Wallenstein's army, in pursuit of Count Mansfeld, turned into Silesia; there were 386 deaths in Luckau, 900 in Kottbus, 500 in Forst, 112 in Spremberg, and 902 in Jüterbog.

Further north, plagues were considerably less widespread in the years 1625-6. In 1625 typhus fever broke out severely in Lübeck and the surrounding country, carrying away 6,952 people, while in Bremen, which had had cases of plague in 1625, a widespread outbreak in 1627 carried away some 10,000 people, natives and refugees. Mecklenburg, being further away from the scene of the war, suffered somewhat less. In the year 1625 bubonic plague, 'head-disease', and dysentery appeared in Rostock, Wismar, Schwerin, Plau, and New Brandenburg. In the following year a plague broke out in Parchim, reached its climax in May, and lasted until November, carrying away 1,600 persons. In Flensburg a plague broke out during the occupation of the Imperialists (1627) and lasted until their departure (1630).

The pestilences of the year 1627 were not very widespread, and this applies also to the territory in Saxony and Thuringia which had suffered so severely in the years 1625-6. On the other hand, the countries in the northern part of Germany, particularly Pomerania and Schleswig-Holstein, were severely attacked in those years, owing to the fact that Wallenstein had transferred thither the scene of the war. In the year 1628 Hamburg had taken in a great many foreign

fugitives, and the result was that typhus fever soon broke out in the city and carried away many thousands of people. The war brought great misery into North Friesland and the Frisian Islands; the Imperialists and Danes oppressed the people by enforced quartering and extortions of all kinds, and the result was famine and plague, lasting until 1630. In Stade, which Tilly in 1629 had made his head-quarters, both the inhabitants and the garrison suffered terribly from a severe epidemic of dysentery. In the city of Schleswig a plague broke out in September, and again in November, in consequence of the quartering of Imperialist troops; it devastated the entire city, so that 211 houses stood absolutely empty on Christmas Day, 1628. Mecklenburg was revisited in 1629, and on August 13 of that year a plague broke out in Rostock and Teterow. Imperialist soldiers conveyed pestilence to the city of Plau, where they passed the night of November 29; but in 1630 it appeared in a much more severe form there and carried away 600 people. In the year 1630 a plague broke out in Mecklenburg, and in Gustrow one raged from May 7 to the beginning of September.

In the years 1628-9 Pomerania was ravaged by the Imperialists, with resulting pestilence and famine. Greifswald suffered for four years from a pestilence which reached its climax in the year 1631. Grimmen, Stargard (3,500 deaths in the years 1627-30), Freienwalde, and other places were also attacked. In Greifenberg, where soldiers had been quartered in large numbers, it raged with unusual fury; three-fourths of the city were devastated, and when the Swedes arrived only 42 houses were uninfected. Kolberg (on the Persante) in six months lost 3,000 inhabitants in consequence of a pestilence. On account of the oppression caused by the war, many citizens fled from Koslin, which, despite the decrease in population, lost 919 inhabitants in the year 1630. In Stolp 800 people died in consequence of a plague.

A plague was borne into Silesia in July 1623, and in Bunzlau an average of thirty persons per week died; of

760 deaths in the year, 640 were due to the pestilence. Many adults fled to near-by villages and died there. In the following year a plague broke out again in Bunzlau, but as only 130 people died there in 1625, it seemed as though the pestilence was over. In September and October, 1626, however, it broke out again, and of 228 deaths that occurred that year, 149 were directly attributable to the plague. In July 1624 it appeared in Friedeberg and carried away 51 persons. In Löwenberg it began in September 1624: the citizens fled from the city and set up tents in the fields, but in spite of this, from forty to fifty people died every day, and the total number of deaths for the year was some 3,000. In the year 1625 the pestilence was very widespread in Silesia—Hirschberg, Löwenberg, Herogswaldau, Liegnitz, Neumarkt, Waldenburg, Neisse, and other places were attacked. In Breslau 'head-disease' raged from June to the end of that year, carrying away 3,000 people; 1626 was also a year of pestilence for Breslau. In Neustadt (Governmental District of Oppeln) a pestilence raged with particular fury from May till September 1625; for the years 1624 to 1627 the deaths were respectively 198, 420, 175, and 472. On August 21, 1626, an army of 6,000 Imperialists under Count von Merode encamped at Goldberg; most of them were infected with disease; and after their departure a plague broke out with such severity that a large part of the population died.

During this time, from 1625 to 1630, when epidemics were raging almost everywhere in North Germany, South Germany also suffered, since diseases were often brought there by Imperialist troops and wandering rabble. In the year 1626 Württemberg alone lost 28,000 people in consequence of plagues.* A pestilence in Augsburg (1628) became very widespread and caused 9,000 deaths. In the year 1629

* K. Pfaff, *Nachrichten über Witterung, Fruchtbarkeit, merkwürdige Naturereignisse, Seuchen u.s.w. in Süddeutschland, besonders in Württemberg, vom Jahre 507 bis zum Jahre 1815.* Württ. Jahrbuch, 1850, p. 80.

'head-disease' broke out in Württemberg and Alsace. During the isolation of the city of Hanau (from December 6, 1629, to March 12, 1630) by the Imperialist commander Witzleben, a pestilential disease, which the soldiers had brought with them, broke out and caused many deaths throughout the entire vicinity.

III. THE WAR YEARS 1630-40

1. *North Germany until the Peace of Prague*

In the year 1630 began in Saxony—in the wake of marching troops—that deadly pestilence which soon spread over all Germany and was chiefly responsible for the enormous loss of human life there in the course of the Thirty Years' War. We may safely assume that bubonic plague was the most common disease, although both typhus fever and dysentery were of frequent occurrence. In the years 1630-1 the pestilence was confined for the most part to North Germany; the Electorate of Saxony suffered the worst, 934,000 people, according to the reports, having died there in consequence of the war and of diseases.⁷

The pestilence broke out in Leipzig in October 1630, and carried away 301 persons; it was borne there presumably by two foreign orange-pedlars. In October of the following year it broke out again, when the Imperialists, after besieging the city for several weeks, on September 13 had finally captured it. The number of deaths in the entire year was 1,754. In the year 1632 Leipzig was once more the scene of grave warlike events, and was compelled to live through a second siege by Wallenstein; the plague began in June, became very widespread in August, and from then till October caused a great many deaths, the total number for the year amounting to 1,390. In August 1633, Leipzig

⁷ Lammert, *op. cit.*, p. 114.

was again besieged, and this likewise caused the outbreak of a plague which lasted until December and carried away 761 persons; in 1634 it was apparently over, for of 306 deaths that are recorded for that year, only 24 were attributable to the plague. In the years 1636-7, however, it reappeared with great severity throughout the entire city. The country surrounding Leipzig suffered a great deal in the year 1633, which was the worst plague-year that Saxony passed through. In the year 1632 Altenburg was occupied by the Swedes, who were infected with some pestilential disease, the germ of which they left behind them when they withdrew on January 13, 1633. The disease spread rapidly, acquired a virulent character, and carried away 2,104 persons, among them many foreign refugees. Grimma and Borna were severely attacked in 1633, while Wurzen suffered less severely.

The country north-east of Leipzig suffered severely from plagues in 1631. After the battle of Breitenfeld (September 15, 1631) most of the wounded were brought to Eilenburg, where in a few weeks a plague broke out and spread so rapidly that 300 people died in the month of October alone. After an abatement during the winter, it recommenced in 1632; the number of deaths for that year was 670, although only 492 of them were due to the plague, while the disease did not entirely disappear until 1636. The city of Belgern, after it was plundered by Holk's troops on October 1, 1632, was visited by a plague; also Dommitsch, Oschatz (where 563 deaths occurred in 1631, and many more in 1633-4), and Ortrand (where there were 800 deaths in the years 1631-3). Plagues raged very frequently in Leisnig, Colditz, and Mittweida, and in the villages and towns surrounding them. In February 1631, Palatinate, Imperialist, and League troops quartered in Leisnig, and the result was that 'head-disease' and bubonic plague became very widespread; in the following year they reappeared, causing 443 deaths, while many thousands are said to have died in the country districts.

The same was true of the year 1633. A pestilence broke out in Colditz in the year 1631, and in the following year 'soldier's disease' (typhus fever) was brought there by Swedish troops, while in 1633 bubonic plague caused 567 deaths. Mittweida suffered from plague in the years 1631-4, 243 persons dying there in the year 1634. In the year 1630 a very severe plague broke out in Freiberg; 1,147 people died in the course of the year, 1,000 of them in consequence of the disease. In the following year there were 124 more deaths. In the autumn of 1632 pestilence raged so furiously that several thousand people died in a short time—about one-third of the population. Most of the bodies were buried secretly, only about 3,000 regular funerals taking place. In the year 1633 there were 1,632 interments, not including those buried in secret. The plague affected the entire vicinity of Freiberg and spared scarcely a single village; many places were left empty and deserted.

In Chemnitz 1,234 interments for the year 1632 are recorded in the church register, and in the following year the plague raged even more furiously: almost every house was attacked, and the number of deaths amounted to 2,500. In Glauchau and vicinity, as in all Saxony, 1633 was the worst year; 964 people died there in that year. The plague raged most furiously from August to November, and lasted until 1634; many bodies were found in the open fields. In the neighbouring Waldenburg 392 people died in a few weeks in 1633, in Lichtenstein 370, in Thurm 400. In Marienberg, a village lying at the foot of the mountains, 1,000 people succumbed in the year 1633 to typhus fever; the plague spread into the Erzgebirge and caused 2,300 deaths in Schneeberg and 157 deaths in the adjacent Neustädtle. A plague had already broken out in Zwickau in 1632, and in the first part of 1633 it became so severe that 1,500 people died in two months in the summer of that year. The city was full of sick people and dead bodies, and the number of reported deaths for the year 1633 was 1,897; but the total number

of deaths, excluding the soldiers, is said to have been no less than 6,000. Entire streets were devastated. Many of the inhabitants fled to near-by villages, and thus spread the infection. Crimmitschau was visited by a plague in 1630 (601 deaths), and again in 1633 (409 deaths); 92 families in the last-named year were completely wiped out. Many neighbouring places were also attacked; there were 700 deaths in Werdau, 300 in Steinleiss, 150 in Königswalde, &c.

The invasion of Holk caused Vogtland to suffer terribly in August of the year 1632, while his second invasion in the summer of 1633 resulted in an even worse outbreak of disease. In Reichenbach and vicinity, typhus fever, bubonic plague, and dysentery prevailed in the year 1633; at first it was called 'soldier's disease', and later 'bright plague' (*helle Pest*). Of 904 deaths that occurred that year, 785 were due to the plague. In Plauen the number of deaths in 1633 was 1,748, in Oelsnitz 325 (217 due to the plague). Holk himself succumbed to the plague in Adorf on August 30, 1633, while 1,000 of his troops also died.

The eastern part of Saxony was also attacked. In Dresden a plague broke out in 1632 and carried away numerous people; it continued to rage in the following year, since the war prevented the adoption of the usual measures of precaution. In the year 1632 the number of Protestants buried by the church was 3,129, and in the following year it was 4,585. Numerous families were wiped out, and many houses were rendered tenantless. In the year 1634 one half of the inhabitants fell victims to the pestilence, while a large part of the city was devastated in 1635. Since the reports of E. J. J. Meyer and of the town council continually speak of 'swellings', the disease was no doubt bubonic plague.* In Dippoldiswalde (south-west of Dresden) it raged so furiously in the years 1631-3 that entire families were wiped out; in those years there were 189, 510, and 250 deaths respectively. Pirna is said to have lost 4,000 inhabitants in consequence of the plague

* E. J. J. Meyer, *op. cit.*, p. 267.

in the years 1632-4, while Dittersdorf (south of Pirna) lost 405 inhabitants in the year 1632. The pestilence was borne by Saxon troops to Sebnitz (south-east of Dresden). In Stolpen it raged from 1632 to 1634. In October 1631 the Croats brought pestilence to Bischofswerda, and more than 200 persons died in consequence of it. In March 1632 another pestilence broke out there, carrying away 660 persons, so that more than one-third of the houses stood empty. In the year 1631 there were 1,000 deaths in Camenz. In Bautzen there was a garrison of 500 men, almost all of whom died in the year 1631; including the residents that were carried away by the pestilence, the number of deaths there for that year was about 1,000. Nor did the pestilence disappear from Bautzen the following year.

Lusatia was also the scene of pestilence; only a few places were spared, and in Upper Lusatia 40,000 persons are said to have been carried away by pestilences in the years 1631-3. In the last part of September 1631, dysentery and bubonic plague broke out in Görlitz, which had a Saxon garrison, and carried away some 400 persons (excluding the soldiers) between then and the end of the year. In June 1632 there was a second outbreak of plague; it reached its climax in October, and carried away 6,105 people (including 106 soldiers) in the course of the entire year. In the following year 726 inhabitants and 435 soldiers succumbed to the disease. Zittau suffered severely; as early as 1633 several hundred soldiers and inhabitants succumbed to typhus fever, while in the year 1632 'burning fever', dysentery, and bubonic plague appeared and carried away 1,246 persons (according to other reports, 1,642 persons). Petechial fever and bubonic plague, after a period of inactivity in the winter, recommenced in the first part of 1633; the latter disease reached its climax in September, carrying away 1,860 inhabitants in that year, in addition to many Imperialist soldiers. From October to December, 1634, Saxon and Brandenburg soldiers, after their return from Bohemia, encamped near

Zittau, where various diseases soon broke out ; the result was that hundreds died, and the entire region became infected.

The Province of Brandenburg was severely attacked by a plague in the year 1631, but in the next year suffered considerably less owing to the fact that the scene of the war was transferred to other parts of Germany. In Berlin 777 people succumbed to a plague in the year 1630, while in the following year it reappeared in a much severer form and carried away 2,066 persons. In Spandau, after the capture of the city by the Swedes on May 6, 1631, famine and pestilence broke out and caused 1,500 deaths. A plague in Potsdam caused 457 deaths between June and December, 1631. Neuruppin, in February of that year, after the occupation of the District of Ruppín by Tilly, suffered from a severe pestilence. Dysentery and 'head-disease' broke out in Rathenow in 1631, reached a climax in July, and carried away 662 people (not including those buried in secret). In Prenzlau 1,500 persons, about one-fourth of the population, died in the year 1631, while Havelberg had 227 deaths, Lindow 400, and Kyritz (after the soldiers had quartered there) 231. Frankfurt-on-the-Oder, which had been occupied by the Imperialists, on April 13, 1631, was captured by Gustavus Adolphus, whereupon a severe epidemic broke out and carried away entire families in the course of a few days ; the alleged number of deaths was 6,000. Müncheberg (north-west of Frankfurt), Quilitz, Drossen, and Guben were also attacked ; there were 365 deaths in Quilitz and 2,000 in Drossen. In the year 1634, when the Imperialists once more devastated the Electorate of Saxony, a severe plague broke out in Luckau, whither many country people had fled ; the spread of the disease is said to have been favoured by the fact that the soldiers broke into and robbed the closed houses of the dead. In Seftenberg (near Kalau) a plague broke out in 1630 and carried away 305 persons that year ; it remained there until 1633, and spread to many near-by villages.

Silesia, after the devastation caused by the pestilences of the years 1624-7, had a few years of rest. In the year 1632, however, infection was brought there from Saxony, though only to a limited extent. On August 1, 1632, Lauban was obliged to surrender to the Saxon garrison, so that for ten days the city and the surrounding country were crowded with troops; the result was that after their departure a severe epidemic broke out and between July and December carried away 1,400 persons. In the very next year severe plagues broke out all over Silesia, when Wallenstein appeared there for the purpose of driving out the Saxons and Swedes. The plague raged so furiously in Silesia that the armies were almost entirely exterminated, and whole communities were wiped out. Golgau, Bunzlau (and vicinity), Greiffenberg, and Friedeberg were attacked. An epidemic of typhus fever carried away 500 people in Hirschberg in the year 1632, and in the following year it became much more widespread and carried away 2,600 persons. 'The infected persons are said to have looked very red, like drunkards, and to have died suddenly.' Almost the entire population of Landshut died in the year 1633. Goldberg (south-west of Liegnitz) had been plundered by Wallenstein's soldiers on October 4 and 5, 1633, and on October 10 Colonel Sparre quartered 200 'badly infected' soldiers there; the result was that a severe pestilence broke out in the city. In August of the year 1633 such a severe pestilence broke out in Liegnitz that it was impossible to bury the victims in the regular way; deep, broad ditches were dug, and from 100 to 200 bodies laid in them. From August 14 to December 22 the number of deaths is said to have been 5,794. Breslau, which at that time had upwards of 40,000 inhabitants, was visited by a plague in September 1633; in the Protestant parishes 13,231 people died in that year, in the Catholic 4,800. Neumarkt (north-west of Breslau) had 1,400 deaths in the same year, while in Brieg, which had a Swedish garrison, there were 3,439 deaths. The city of Schweidnitz

suffered terribly ; 30,000 soldiers under Wallenstein and 25,000 Swedish soldiers were encamped there, and the plague was so severe that 8,000 of the former and 12,000 of the latter are said to have died. In the city itself, which was harbouring innumerable fugitives from the surrounding country, sick people and dead bodies soon filled all the streets ; on August 25 alone, 300 people died. The number of the dead, including from 2,000 to 3,000 that were buried secretly, and also the outsiders, was 16,000 to 17,000 ; more than two-thirds of the population are said to have succumbed. The pestilence was borne from Schweidnitz to Peterswaldau and Nimptsch, where from 2,000 to 2,400 persons died. On May 31, 1633, Wallenstein came with his army to Glatz, bringing pestilence with him ; in Glatz itself 4,284 people were carried away, while many hundreds died in the surrounding country. Petschkau was almost completely wiped out. In Neisse the number of victims is estimated at 6,000 ; 5,272 are recorded in the church registers.

Generally speaking, Thuringia was but slightly affected by plagues in the years 1631-3, but suffered terribly in the years 1634-5 ; for in those years there, as in all Germany, a great famine prevailed. In Koburg a plague broke out in the year 1630 ; in 1632 there was an epidemic of ' head-disease ', which carried away 300 persons in October alone, and in 1634 an epidemic of bubonic plague, rendered even more destructive by famine, carried away 1,143 victims. Several pestilences (dysentery and ' burning fever ') also broke out in the Koburg region, caused by the quartering and ravaging of Swedish troops ; the inhabitants died by hundreds. Hildburghausen suffered from a plague from June on ; whereas only 106 people had died there from January to May, the number of deaths in June alone was 215. In the following year 534 people died there from starvation and pestilence, while 169 died in near-by Streufdorf. Eisfeld (west of Hildburghausen) in 1632 had been plundered by Swedish troops, and from that time on suffered from

pestilence. In Meiningen, in the latter part of 1635 and the first part of 1636, 500 people succumbed to a plague (106 in November alone). Suhl, which on October 16 had been burned by Isolani's soldiers, and Themar—both near Meiningen—had 1,634 deaths. In the following year 519 people died in Schmalkalden and vicinity—250 in Tambach, 300 in Vachdorf, and 1,600 in Salzungen. In the year 1634 the number of deaths in Eisenach was 1,800, and in the following year 1,600; in the year 1636 there were only 405 deaths there. Erfurt suffered very little in 1635, while Ohrdruf had 1,065 deaths, Wechmar 503, and Arnstadt 464. In Weimar 1,600 people died in the year 1635, among them 500 foreigners from Franconia who had taken refuge there. The cities lying further east in Thuringia had been severely attacked in the years 1632 and 1633, in consequence of the pestilences in Saxony; for example, Gera, which had been infected in 1633 by Holk's troops, the nearby village of Untermhaus, which in the two years had 211 and 600 deaths respectively, and also many other villages in the surrounding country. A plague in Schleiz carried away 600 persons in the year 1632.

In Rhineland and Westphalia pestilences broke out only sporadically in the years 1630-4, but in 1635 they became more general. In the year 1630 Münster was attacked, in 1631 Arnsberg, and in 1632 a pestilence raged furiously in the Berg country—in Lennep, for example, where the Imperialist troops were for a long time quartered. In Mühlheim-on-the-Rhine a pestilential disease broke out after the departure of the Nassau-Lorraine garrison in 1631. In the year 1632 the Imperialist and Swedish armies stood facing each other in Westphalia for six weeks, and the result was an outbreak of pestilence: 600 people succumbed to it in Bielefeld. In 1635 a pestilence raged furiously along the Rhine; in St. Goar 200 people died in the course of the summer. In that year Westphalia was the scene of warlike events and pestilences; Arnsberg, the villages on the Ruhr,

Soest, Unna (near Hamm), Horstmar, and Kroesfeld were attacked. The Governmental District of Düsseldorf (on the left bank of the Rhine) was severely attacked by pestilence; many people died in Geldern, while there were 389 deaths in Strälen, 256 in Nieukert, and 700 in Lobberich.

2. South Germany

(a) Bavaria and Upper Swabia

After the battle of Breitenfeld (September 17, 1631) Gustavus Adolphus passed through Halle and Erfurt to Würzburg, Aschaffenburg, and Frankfurt-on-the-Main. Tilly had marched through Halberstadt, Fulda, and Miltenberg to Würzburg, in order to relieve that city, which had been captured by the Swedes, and then turned south. Thus the principal scene of the war was transferred to Bavaria, which from 1631 to 1634 suffered terribly from the ravages of the soldiers passing back and forth. No part of the country was spared. 'The Thirty Years' War', says Lanimert,⁹ 'was particularly fatal and disastrous to Bavaria from the year 1632 on; it converted the country into an uninhabited waste, especially because it was followed by pestilence. Like the Imperialist army under Tilly in the autumn of 1631, so the Swedish army on its marches consumed everything it found, and wherever it went in the years 1632-5 it spread 'hunger typhus' and 'war typhus' and bubonic plague; all the places along the Main lost at least one-half of their population.' In September 1632, when Gustavus Adolphus withdrew from Nuremberg Wallenstein turned south, and there on November 6, 1632 Gustavus Adolphus was killed in the battle of Lützen. After that Wallenstein returned to Bohemia while the Swedes under Bernhard von Weimar marched back into Bavaria. The acme of misery was reached here in the year 1634. 1

⁹ Lanimert, op. cit., p. 12.

is impossible to enumerate all the places that were infected by the brutalized, wandering soldiers; the most out-of-the-way and indigent regions, such as the Spessart and the Odenwald, were visited by them, and inasmuch as they brought pestilence wherever they went, the unfortunate villages were subjected to merciless devastation.

1. The region of the Main. Since Gustavus Adolphus first had Hurn occupy the bishopric of Bamberg, and himself marched through Aschaffenburg to Nuremberg, while Tilly returned to Ingolstadt and later to Leica, the region of the Main, and later the region north of the Danube, were the first to be attacked by typhus or a bubonic plague; not until later, from 1633 on, did the pestilences spread more or less extensively in the whole of the Danube.

In Aschaffenburg and vicinity typhus broke out in the summer of 1632 and almost wiped out several villages; the city of Aschaffenburg itself, which lost a large percentage of its inhabitants, was visited in the year 1635. In Würzburg the pestilence broke out in August 1632, and in the last part of July of the following year another serious pestilence broke out there, in consequence of which 489 bodies were buried in the cathedral parish alone. The prolonged quarantining of troops, notwithstanding all the precautionary measures that were adopted, caused the pestilence to rage with extraordinary fury; not until September did it begin to abate. In 1635, when infected soldiers were transferred from Schweinfurt to the stronghold of Marienberg, it appeared once more. In 1632 Schweinfurt lost 'several hundred people' in consequence of 'pestilential disease' (typhus fever). The total number of deaths was 1655. In December of the following year another large pestilence broke out, and again in August 1635; it reached a climax in September and came to an end in December. In Bamberg many people succumbed in 1635 to Hungarian disease, which the Swedes had borne thither in the spring. This disease was also very

widespread throughout the entire vicinity. In the year 1634 the Swedes came several times into the region around Bamberg and plundered the country, so that famine and plague caused great misery. In the summer of 1635 Bamberg was once more attacked by an infectious disease (typhus fever), and only two houses in the city were spared. In Kulmbach the plague raged extensively in the first part of the year 1633; the number of the dead was so large that the bodies could not all be buried in Kulmbach, and some had to be taken to the churchyards of near-by villages. In the following year the plague broke out anew, carrying away 60 persons in a single day. In Bayreuth 400 persons succumbed to a pestilence in the year 1632, and in the following year 360 died; it raged even more furiously after the city was plundered by the Master of Ordnance, von der Waal, on August 19, 1634. From July to October 1,927 out of 7,000 inhabitants died, while the average number of deaths amounted to only 167 per annum.

2. The region between the Main and the Danube suffered no less. Nuremberg and vicinity was severely attacked by pestilence in the year 1632. In the summer of that year Wallenstein encamped near Fürth, and Gustavus Adolphus near Nuremberg; they watched each other for a long time without venturing a battle. The country people had all fled to the city. In the Swedish army and in the overcrowded city, which had some 50,000 inhabitants, scurvy and typhus fever carried away many thousands.¹⁰ Only 4,522 bodies were buried by the Church, but many more thousands died. Two weeks after his disastrous attack on Wallenstein's camp on September 4, Gustavus Adolphus marched south, while Wallenstein turned into Saxony. The plague continued to rage in the vicinity of Nuremberg, and

¹⁰ Joannes Roetenbeck, *Speculum scorbuticum oder Beschreibung des Scharbocks in zweyen Traktällein, abgefasst dem gemeinen Mann zum Besten*. Nuremberg, 1633.—Caspar Horn, *Kurzer Bericht von der fremden, vordem bei uns bekannten, jetzt aber eingreifenden Krankheit, dem Scharbock*. Nuremberg. Quoted from F. Schnurrer, op. cit., vol. 2, p. 174.

many people contracted the disease by visiting the deserted camp of the Imperialist army and appropriating the left-behind implements, weapons, and kitchen utensils. Scurvy was still raging in Nuremberg in the following year. In the year 1634 the plague broke out and carried away 18,000 persons. In December 1631 Forchheim was besieged by the Swedes under General Horn, and the result was that a pestilence broke out in the year 1632 and carried away 578 inhabitants; the average number of deaths per annum was 45. In March of that year the Swedes had deserted the city, and in June 1634, when they reappeared there, the mortality increased again. In the years 1631-2 Uffenheim suffered a great deal from the predatory raids of the Swedes and also from plague, which in the year 1634 became very widespread there as in all Bavaria, carrying away one-half of the inhabitants of the town. While the Swedes and Imperialists were establishing their camps near Nuremberg, many people from Ansbach and other places fled to Windsheim, which thus became greatly overcrowded; the consequence was that people died there by the hundred, and their bodies were buried, thirty or forty at a time, in large ditches. When the Swedes left Nuremberg and appeared in Windsheim, they left behind them 450 men who were infected with disease; in the entire year 1,564 bodies were counted. In the following year the city was besieged by the Imperialists (October 12-23, 1633), and during this time 360 persons succumbed to a pestilential disease; the number of deaths in the entire year, including the outsiders, was 1,600. Windsheim also suffered greatly in the two following years; at the end of the year 1635 there were only 50 inhabitants left. In near-by Burgbernheim, where typhus fever raged in the year 1630, 155 persons died in the year 1632, 165 in 1634, and 107 in 1636. In Schwabach, which had been plundered by the Imperialists in the latter part of July, 1632, various diseases broke out—'Hungarian disease, dysentery, and even bubonic plague.' In the year 1633

there were 298 deaths in Weissenburg; in 1634, on the other hand, there were 642. Eichstätt had 494 deaths in the year 1632, 827 in 1633, and 982 in 1634; in the last year the town was besieged and captured by the Swedes, and for a few days thereafter pestilences raged furiously. The country districts throughout Central Franconia, like these cities, were almost completely depopulated by flight and pestilence.

The Upper Palatinate was also severely attacked by pestilence (typhus fever and bubonic plague), which spread far into the Bavarian Forest. In Amberg an epidemic of typhus fever and dysentery broke out in the year 1633, and in April of the following year bubonic plague appeared; the latter disease carried away from 15 to 20 persons on many days of that month, while in July and August as many as 40 people died every day. In the spring of 1634 Weiden became infected with typhus fever and shortly after that with bubonic plague; from August 17 to November 6, some 1,800 people died. The bodies were corded up like piles of wood, placed in ditches in groups of 200 and 300, and covered with quick-lime. In Schwandorf (north of Regensburg) the Imperialists had encamped in the summer of 1634; after their departure a pestilence characterized by 'swellings and large unknown spots' broke out and carried away almost one-third of the inhabitants. In Hemau (north-west of Regensburg), after the Swedes had passed through the town, 'the malignant pestilence' (typhus fever) had broken out in the year 1633; and in 1634, after the devastations committed by the troops of Bernhard von Weimar, bubonic plague appeared and carried away one-half of the inhabitants.

3. The cities on the Danube. In the year 1632 Neuburg was occupied by the Swedes; after their departure, on October 18, an epidemic of Hungarian head-disease broke out and carried away many soldiers and citizens (more than 900 in eight months). Again in the two following years pestilence caused great devastation. On April 29, 1632, the

Swedes appeared before Ingolstadt, but in a few days withdrew; there was a strong garrison in the city, however, and many fugitives had gathered there. In this overcrowded population typhus fever broke out and carried away large numbers of people. In the following year the disease became even more widespread, and 1,039 people succumbed to it before the end of November. In the first part of the year 1635 the pestilence abated. In the second half of the year 1634 Regensburg was attacked by bubonic plague, and despite all measures of precaution it carried away two-thirds of the population (according to other reports there were 3,125 deaths). The entire vicinity suffered from the plague. The mortality in Straubing during the siege of the Imperialists (March 1634) increased greatly; even in the year before it had been very high (294 deaths). The total number of deaths in the year 1634 is not known, but of three parishes St. Jacob's alone had 631 burials. Deggendorf and Passau fared similarly.

4. Upper Bavaria and Lower Bavaria south of the Danube. On May 17, 1632, Gustavus Adolphus had occupied Munich, and during his short sojourn of three weeks apparently no epidemic diseases made their appearance among the Swedes. But since typhus fever had broken out everywhere in the vicinity, strict measures of precaution were adopted by the city authorities. According to G. von Suttner¹¹ 124 people in the quarantine-house before the Schwabinger Tor succumbed to 'burning fever and headache' between August and the end of the year. According to a report published in 1632 the poor people suffered in particular, while red spots, continual headache, and later on diarrhoea, characterized the disease. A very severe pestilence broke out in Munich in the year 1634. 'The epidemic was caused', says Seitz,¹² 'by the arrival of 4,000 Spanish soldiers in July of the year

¹¹ G. von Suttner, *München während des dreissigjährigen Kriegs*. Munich, 1796. Quoted from F. Seitz, op. cit., p. 63.

¹² F. Seitz, op. cit., p. 66.

1634; they were called there from Tölz and Weilheim when the Duke of Saxe-Weimar and General Horn were threatening the city. Although shortly after that, in August, a few evidences of disease were noticed, it was not regarded as infectious. Finally, however, a real plague broke out with such fury that four lazarets and a garden outside of the city had to be made ready for the care of the sick. It raged most furiously in the months of October and November, when from 200 to 250 dwellings, among them entire houses, were quarantined every week. Thus it went on until the end of December.' Unfortunately there exists no medical description of the disease, the most important characteristics of which were chills, accompanied by internal fever, violent headaches, great lassitude, haemorrhage, plague-spots, and swellings. All told, some 15,000 persons are said to have died in the year 1634—about one-half of the total population of the city. The bodies of victims became so numerous that they were piled up in the streets and houses, without attempt to keep a record of the names, and buried in ditches forty at a time. Strict isolation of the patients by closing up the houses was enforced, and the use of the clothes and bedding of the dead was forbidden under severe penalties; such effects were burned outside of the gates. Only two gates remained open, and in front of one of them a garden was made ready to receive strangers who were denied admittance into the city. In February 1635, the pestilence had almost entirely ceased, but in September it broke out anew and did not disappear until February 1637.

In the years 1633-4 typhus fever and bubonic plague were spread throughout all Upper and Lower Bavaria by the continued marauding of the Swedes. The Imperialists, no less than the Swedes, helped to devastate the country, while the Spanish soldiers had the worst reputation of all. Again in the year 1635, especially in the autumn, the pestilence appeared. A plague broke out in Freising after the town was plundered by the Swedes on July 16, 1634 (Landshut

had already been captured by them on May 10, 1632), and after their departure they left behind them an infectious disease which was diagnosed by the town-physician as Hungarian fever. A pestilence broke out in the city when it was plundered by the soldiers under Bernhard von Weimar, on July 10, 1634, and carried away one-third of the inhabitants; according to a list furnished by the court the number of deaths was 738, but there were many more with whose legacies the court had nothing to do. The bodies were piled up on wagons and conveyed to cemeteries, while the dwellings of diseased persons were closed. In Dingolfing, which was occupied by the Swedes from July 22, 1633, to June 1634, a plague raged with such fury that it was thought the city would be completely wiped out. Simbach-on-the-Inn and the near-by market-town of Thann suffered greatly from a plague in the year 1634. In Thann many bodies lay for a long time in the houses unburied, while entire families among the poorer population were wiped out of existence. The plague also raged in the surrounding localities, and many bodies lay in the streets as food for scavenger birds. A plague raged in the years 1633-4 in Traunstein, which had already had a few isolated cases of disease in the previous year; 123 people died terrible deaths in the two years mentioned, and also in the years 1635-6. In the year 1634 a pestilence caused 500 deaths in Rosenheim, while severe outbreaks of pestilence were reported from many surrounding places—Aibling, Miesbach, Wasserburg, and Tegernsee.

In Tölz twenty-seven adults succumbed in May and June 1633, to Hungarian disease; a pestilence also broke out in the spring of 1634 and carried away hundreds of people in the months of May, June, and July. From July on, the church-registers contain no more entries; the patients with black swellings usually had but a few hours to live. In Oberammergau 'wild headache' raged in the years 1631 and 1633, and many people succumbed to it. In September 1634, the town became infected with bubonic plague, and up to

October 28, eighty-four people succumbed to the disease—about one-fifth of the population. The epidemic caused the people to vow that they would produce the Passion Play there every ten years. Murnau, Weilheim, and other places were severely attacked in the year 1634. In Andechs the mortality was increased in the year 1634 by an outbreak of dysentery and typhus fever, and on July 27 bubonic plague also appeared and remained until November, carrying away 200 of the 500 inhabitants of the town. In Landsberg typhus fever broke out very seriously in the year 1630. 'All over the bodies of the people who contracted the disease', says Lammert,¹³ 'red spots appeared, and then the victims lost control of themselves and knocked their heads against the walls. Many who seemed scarcely to have contracted the disease died suddenly. Dead bodies were found everywhere, even in public squares.' In the following year the disease spread even further; the vicinity of Landsberg was infected by the soldiers, who were constantly marching back and forth. After the terrible plundering of the city in April and September of the year 1633, a plague broke out and carried away a large proportion of the few inhabitants that were left.

5. The governmental district of Swabia fared no better than the aforesaid Bavarian countries, while the region on the northern side of the Lake of Constance suffered terribly from the predatory raids of the Swedes and the consequent epidemics. In Augsburg, which from April 1632 to 1635 was occupied by the Swedes, the suffering began when the city was besieged by the Imperialists. During a siege of seven months (September 1634 to March 1635) famine and pestilence did a great deal more damage among the population than the bullets and swords of the enemies. Whereas this population numbered from 70,000 to 80,000 in the year 1624, by October 12, 1635, it had dwindled to 16,422. After the city had surrendered to the Imperialists, people still

¹³ Lammert, *op. cit.*, p. 110.

continued to die in consequence of pestilential diseases; the town council therefore gave orders on July 7, 1635, that all refuse should be removed from the city. Not until the winter did the pestilence disappear. In Memmingen there were 1,200 deaths in 1633, and 1,400 deaths in the following year; the worst year was 1635, when the pestilence is said to have carried away 3,000 persons. The towns surrounding the city were also severely attacked. In Kempten, which was oppressed by the Swedes and Imperialists in the years 1632-3, a pestilence broke out in the year 1634 and lasted well into the next year, carrying away 3,000 people. In the surrounding country, pestilence raged so furiously that many places were completely wiped out. In the near-by towns of Kaufbeuren, Immenstadt, Pfronten, Füssen, &c., the pestilence was likewise very widespread; in 1635 there were 1,600 deaths in Füssen—about one-quarter of the inhabitants.

The predatory incursions of the Swedes extended even to the Lake of Constance. In the year 1634 the number of deaths in Lindau was 800; at the beginning of the year 1633 Weingarten, Wangen, and Tettnang were occupied by the Swedes, who brought infectious diseases with them wherever they went. Tettnang, which in 1633 had more than 2,500 inhabitants, in 1636 had but 150. In Ravensburg a plague broke out in the year 1635, reached a climax in September, and in six months carried away 3,100 people. In Constance Hungarian disease raged in 1633, and is said to have carried away its victims within a few hours; in 1635 bubonic plague also broke out and caused 2,000 deaths.

b. South-western Germany

The battle of Nördlingen (September 5 and 6, 1634) was an important turning-point in the war, important for Bavaria for the reason that it freed the country from the predatory incursions of the Swedes, and disastrous to Württemberg, Baden, Hessen, and the Upper and Middle

Rhine region, whither the defeated Swedish-Protestant army retreated, and where the fighting was now carried on for the next few years. Nördlingen had been besieged by the Imperialists, who were supported by a Spanish army; Bernhard von Weimar and Horn tried to relieve the city, but were completely defeated in the attempt. The Swedes turned and fled to the Rhine, and in a few weeks the entire south-western part of Germany was filled with Imperialists who had followed in pursuit.

The sufferings of the inhabitants of Württemberg, partly on account of the deeds of violence committed by the Imperialists, and partly on account of pestilences, were frightful.¹⁴ On September 10 the Imperialists entered Stuttgart, which they continued to occupy until March 30, 1638. In the year 1631 the city had 8,300 inhabitants, and in the year 1634 the number of deaths was 936, of which 672 were due to the pestilence. In the following year the pestilence became more widespread, being helped along by numerous fugitives from the surrounding country and by famine; the number of deaths was 4,379, and it was necessary to dig large ditches and bury a hundred bodies at a time. From January to July 1636, there were 319 deaths due to the pestilence, which in the following year raged even more furiously and carried away 945 persons. The mortality was equally high in the year 1638, when the city was occupied alternately by the Swedes and Imperialists; the latter, when they departed in October, left behind them 6,000 diseased and wounded men. In near-by Cannstatt 1,300 people died in 1635. In Esslingen a plague broke out in 1634 and in 1635 became more and more widespread in consequence of the continual marching back and forth of the soldiers. It made havoc especially among the 12,000 fugitives from the surrounding country, who were packed together in stables and barns, and in many cases under the

¹⁴ Th. Schön, *Bilder aus Württembergs Leidenesgeschichte nach der Schlacht bei Nördlingen*. *Blätter für württ. Kirchengeschichte*. 1891. P. 14.

open sky. Owing to the incipient famine the pestilence spread with great rapidity; 12,000 people are said to have died, among them 600 out of 1,000 citizens, notwithstanding the fact that various measures of precaution were adopted (removal of refuse, fumigations on a large scale, &c.). In Göppingen, which was occupied by Imperialist soldiers a few weeks after the battle of Nördlingen, pestilence soon broke out and carried away 656 persons between October 1 and the end of the year (1634); in the following year there were 904 deaths. In the year 1636 Gmünd had a very severe pestilence, which on many days carried away from thirty to forty persons; large graves were dug and from forty to fifty bodies buried at a time. Aalen, in consequence of the continual marching back and forth of the soldiers, of quartering, and of extortions, suffered severely; there, and in the country round about, a plague raged furiously in the year 1634. Krailsheim and Hall, comparatively speaking, fared well. In Hall, the parish of St. Michael, in which the average number of deaths for the years 1621-30 was 112, in the year 1634 had 1,116 deaths (999 in the months of August-December), while there were 372 deaths in the year 1635.¹⁵ The fugitives in the city and the people who died there are not included. In Oehringen, after the town was plundered by the Imperialists from September 13 to 18, a very severe pestilence broke out and carried away 1,131 persons. The neighbouring towns and villages also had a great many deaths due to pestilence—Neuenstein 1,100, Waldenburg 452, and Künzelsau 900. The entire Hohenlohe Plateau was severely attacked by pestilence; in the little town of Grossbottwar, first 'head-disease' broke out in 1635, then dysentery, and finally bubonic plague; between the months of July and December 692 persons succumbed to these three diseases. In June 1635, there were 775 deaths in Lauffen-on-the Neckar, 1,609 in Heilbronn, 646 in Weinsberg (out of 1,416

¹⁵ J. Gmelin, *Bevölkerungsbewegung im Hällischen seit Mitte des 16. Jahrhunderts*. G. von Mayr's *Allg. statist. Arch.* Vol. vi, p. 240. 1902.

inhabitants), 1,802 in Vaihingen (only 48 in 1631), and 1,019 in Bönningheim (among them many outsiders).

In the towns on the Upper Neckar and on the northern border of the Swabian Alp a very severe pestilence likewise broke out. Nürtingen was devastated by the Imperialists after the battle of Nördlingen, and in the years 1634-5 there were 1,154 deaths in consequence of a pestilence. The surrounding country also fared badly; for example, Urach and the near-by Alp villages. In the year 1634 a plague broke out in Tübingen, and in the following year it spread widely in consequence of famine, compelling the university faculty to leave the city. The highest mortality was reached in October (386 deaths), while the total number of deaths for the entire year was 1,485. The plague raged no less furiously in Rottenburg-on-the-Neckar. Nor was the Swabian Alp spared; in the village of Gruibingen there were 90 deaths in 1634 and eighty-six deaths in the year 1635. Böhmenkirch was almost completely wiped out. In Gussenstadt, whither many inhabitants of the surrounding country had fled, the usual mortality per annum was 12 or 14; in the year 1634 there were 313 deaths up to December 7, while in the year 1635 there were 137 deaths up to September 23. In the months of November and December (1634) alone there were 157 deaths, and the inhabitants frequently died at the rate of 4-6 per diem.¹⁶

After the battle of Nördlingen thousands of the inhabitants of the surrounding country fled to Ulm, where epidemics had broken out in the year 1634 and carried away 1,871 persons. In June 1635, the general misery caused a plague to break out there; in the morning many dead bodies would be found lying in the streets and in front of houses. In the course of eight months 15,000 persons were carried away, among them 4,033 fugitives and 5,672 beggars; in the following year only 496 persons died, all told. Even the

¹⁶ G. Thierer, *Ortsgeschichte von Gussenstadt auf der Schwäbischen Alb*. Stuttgart, 1912. Vol. i, p. 207.

Black Forest district of Württemberg suffered in consequence of the war and of pestilence; Tuttlingen in the year 1635 had 546 deaths, Calw 772, and Freudenstadt 434; Neuenburg, Nagold, Sulz, and other places were also attacked.

How terrible was the loss of human life in Württemberg in consequence of the war and of pestilence is shown by the fact that the population of the city decreased from 444,800 in the year 1622 to 97,300 in the year 1639; the population in 1634 was 414,536. In the short period of five years (1634-9), in consequence of the invasion of the Imperialists after the battle of Nördlingen, and of the pestilence and famine caused thereby, the country lost 300,000 inhabitants, or about three-fourths of its population.

The northern part of Baden suffered severely in the years 1634-6; Pforzheim lost at least one-third of its inhabitants in consequence of famine and pestilence, while Durlach and Mannheim are also reported to have been attacked.

That part of Hessen lying on the right side of the Rhine was likewise visited by pestilence. In Wimpfen-on-the-Neckar a plague broke out in August, 1635, and in the period between August 12 and December 31 there were 494 deaths there. Bensheim, Zwingenberg, Gernsheim, Babenhausen, and Seligenstadt fared no better. Darmstadt, with 212 deaths in 1633 and 220 deaths in 1634, had an increased mortality, but in 1635 some 2,200 bodies are said to have been buried there; at first it was 'head-disease', and afterwards 'a poisonous pestilence'.

The Lower Main region suffered terribly in the year 1635 from famine and pestilence; the Wetterau, the Palatinate, and Alsace-Lorraine were all attacked. Frankfurt-on-the-Main had been occupied by the Swedes in the latter part of 1631, and after that the mortality increased; whereas in the years 1630-2 the average number of deaths was 1,598, in 1633 it increased to 3,512, in 1634 to 3,421, and in 1635 to 6,943. This includes all the Protestant population, only a part of the Catholic population, and none of the Jews.

The large number of country-people who had fled to the city rendered the general condition worse and helped to spread the pestilence. The worst month was September 1635, in which 1,112 persons died. According to a Frankfurt physician, Hörnigk, the crisis came on the fifth or sixth day, while many people contracted the disease not only once, but as many as seven times.¹⁷ We see from this last observation that the various infectious diseases at that time were not distinguished, but were regarded as different stages of one and the same disease.

In near-by Hanau, after it was occupied by the Swedes and Hessians on October 2, 1634, famine and pestilence appeared; in June 1635, an epidemic of bubonic plague broke out there, reaching a climax in August, and gradually disappearing with the beginning of the cold weather. The mortality among the citizens and fugitives was very great, but the statement that 21,000 people died in Hanau is perhaps an exaggeration. Upper Hesse was devastated in 1635 by famine and pestilence; in Giessen, for example, 1,503 people died (according to the grave-diggers' records), and in Lich, a small fortified town, there were 1,225 deaths, including 22 soldiers and 549 fugitives from the surrounding country.

In the Rhenish Palatinate, after it was occupied by the Imperialists, conditions were terrible; famine and pestilence lasted from 1635 to 1639. In the year 1635 General Gallas retreated from Dieuze to the Rhine, and in the same year serious diseases broke out there (dysentery, typhus fever, &c.), so that the streets and fields were covered with the bodies of his soldiers. Wherever he went these diseases were transmitted to the local inhabitants, so that many places lost more than half of their population. Pestilence was also transmitted to other cities and towns in the Palatinate; in Zweibrücken, which had 3,000 inhabitants, 250 married

¹⁷ Hörnigk, *Würgengel*. P. 105. Quoted from Lammert, *op. cit.*, p. 201.

persons died between August 1, 1635, and April 1, 1636; many villages in the vicinity were entirely depopulated. In Kaiserslautern, which on August 17, 1635, was stormed by the Imperialists under General Hatzfeld, and was thereafter subjected to an inhuman sacking, a severe plague broke out in the year 1636 and carried away large numbers of people. In Worms numerous people succumbed that year to dysentery.

In Alsace an epidemic of bubonic plague broke out in August 1636; it had been brought there by the troops of the Count-Palatine von Birkenfeld and became very widespread among the fugitives in the overcrowded city of Strassburg. From thirty to forty bodies were buried in a single day, and in the entire year there were 5,546 deaths, including 1,000 fugitives and soldiers. The disease continued to reveal its presence until the next spring, and by that time 8,000 persons are said to have died in Strassburg. In the year 1635-6, owing to the perpetual condition of war, which made it impossible to cultivate the fields, there ensued a terrible famine, and this did a great deal to further the dissemination of pestilence. Zabern, where there was a strong garrison, and where many soldiers were quartered, suffered terribly in the year 1634, and again in the years 1635-6 widespread pestilences broke out, and the Imperialists died there 'like cattle'.

Lorraine also suffered terribly. In the year 1635 Bernhard von Weimar and Cardinal La Valette were obliged to retreat before Gallas to the vicinity of Metz, where they arrived on October 1; the troops brought fever, dysentery, and 'Swedish plague' with them; the last-named disease, which has been held to be typhus fever, became more widespread in Metz in the year 1636 than it had ever been before—it was *la plus meurtrière et la plus désastreuse des temps modernes dans notre pays*.¹⁸ The precautionary measures of the city administration—cleaning of the streets, isolation of the patients, closing of infected houses—were of no avail. Many

¹⁸ Maréchal et Didion, op. cit., p. 185.

bodies were cast into the Mosel, and before the gates of the city the streets and fields were covered with dead men and horses. Also in the neighbouring cities, especially in Verdun and Nancy, the losses in consequence of the pestilence were great.

Conditions were equally bad in the adjacent Luxemburg. 'The French as enemies,' says Lammert,¹⁹ 'the Croats, Hungarians, and Poles as defenders, committed the most terrible devastations in the country through which they passed. Famine, poverty, and a furious pestilence completed the misery. Entire villages were wiped out; in the city of Luxemburg the churchyards no longer had room for the bodies, and places for burial had to be prepared within the fortifications. Throughout the entire province 11,000 persons, one-third of the inhabitants, lost their lives.'

In the year 1637 Count Bernhard von Weimar transferred the scene of the war into southern Baden, where, during the siege of Breisach, from July 5 to December 18, 1638, an epidemic of scurvy caused increased misery. In the year 1639 large numbers of people in the Lörrach district were carried away by the pestilence, among them Count Bernhard himself.

3. North Germany (1636-40)

In North Germany the war against the Imperialists was continued by the Swedes under Banner. On October 4, 1636, the Imperialists were defeated at Wittstock (province of Brandenburg, district of East Priednitz), whereupon the Swedes in that very same year overran Saxony and Thuringia. In 1637, to be sure, they were thrown back into Pomerania by Gallas, but in 1638 they reappeared in Saxony, and in 1639 won a brilliant victory at Chemnitz. Thereupon Banner undertook a campaign into Bohemia, whence, in 1641, he was forced to retire. Shortly afterwards (May 10, 1641) he died in Halberstadt.

¹⁹ Lammert, *op. cit.*, p. 218.

These campaigns spread severe pestilences throughout the above-mentioned regions of North Germany, particularly the southern part of Brandenburg and the modern province of Saxony. The largest part of the Altmark resembled a 'large lazaret'; in Wittstock itself there were 305 deaths in the year 1636, in Bismark 163, and in Salzwedel 193; in Werben a plague broke out after the soldiers had been quartered there and lasted well into the next year. In Stendal it began in June 1636, and carried away 1,992 persons in that year, as compared with an average annual mortality of 120-30; nor does the number include the peasants that had fled to the city, 3,000 of whom died. The pestilence spread over the entire vicinity and wiped out whole villages. In Tangermünde a pestilence broke out even before the battle of Wittstock; it was borne thither by Imperialists and Saxon artillerymen. In Gardelegen, where Banner had his head-quarters, 500 people in the parish of St. Nicholas and 1,205 in the parish of St. Mary, succumbed in the year 1636 to bubonic plague and other diseases, among the dead being 195 soldiers. In Neuhausenleben, whither many country-people had fled, a plague broke out in May 1636, and spread throughout the entire vicinity; in many days in September, thirty and more bodies were counted, while the incomplete church register records 778 deaths. The total number of deaths is said to have been 2,560.

Typhus fever and other infectious diseases raged furiously in Magdeburg, and, as before, the country south-west of Magdeburg also suffered. In Gross-Salze, which had received many fugitives, 701 persons succumbed in the year 1636 to dysentery and bubonic plague, among them 329 outsiders; the climax of the pestilence occurred in July, when there were 162 deaths. In Egelu, as in Gross-Salze, a plague broke out in May 1636, carrying away 164 persons (134 of them outsiders) in June, 63 natives and 84 outsiders in July. In Wolmirsleben a pestilence raged from April to the middle of

September 1636, and carried away 130 people. In Atzendorf typhus fever and bubonic plague broke out in the spring of the year 1636 and carried away 617 persons, inclusive of outsiders. In Wanzleben 600 persons succumbed in the year 1636 to bubonic plague, and 300 to other diseases and starvation. In Aschersleben a pestilence broke out on April 2, 1636, reached a climax in November with 217 deaths, and carried away, all told, 1,125 persons in that year (including 499 outsiders and soldiers). In Zerbst, where infected soldiers were quartered, the epidemic was particularly widespread; of the fugitives in the city 1,500 succumbed. In Wittenberg and vicinity dysentery and typhus fever broke out in the year 1636, and in the fall of that year bubonic plague also made its appearance and lasted well into the following year, carrying away thousands of people. In Merseburg, in the parish of St. Maximus alone, there were 942 deaths in the years 1636-7, and in Eisleben there were 1,598 deaths (including the outsiders) in the year 1636. Halle and vicinity, in the summer of 1636, had an outbreak of 'spotted fever with dysentery' and bubonic plague; the number of deaths was not less than 3,440.

In Thuringia a plague raged extensively in the years 1636-7. In Hildburghausen there were 648 deaths due to a plague in the year 1636, in Jena 691 (not including the outsiders), while in the year 1637 there were 307 deaths in Arnstadt and 525 in Zeitz. In many smaller places dysentery and bubonic plague broke out, having been borne there by soldiers and wandering beggars.

In Saxony (present kingdom) pestilences reappeared after the invasion of Banner in the year 1637. In Leipzig a great many homeless people took refuge; within three months 2,500 persons died there, and in the entire year 4,229 out of 15,000 inhabitants succumbed to various diseases. Pestilences also broke out with renewed strength in near-by cities and towns; by September 1,000 natives and 2,000 outsiders died in Grimma. In Leisnig, fever, 'head-disease',

and diarrhoea appeared. After the burning of the city by the Swedes, a plague broke out and carried away 2,200 persons in six months, including the outsiders. Colditz, which had suffered great losses in the last six years, had 352 deaths; the population so dwindled away that in the year 1638 it amounted to only 28. In Döbeln there were 674 deaths, in Oschatz 2,000 (including the outsiders), and in Mügeln more than 1,000. The near-by cities, belonging to the governmental district of Merseburg, also had a very high mortality; in Belgern there were 765 deaths, in Delitsch 881 deaths, while in Eilenburg 8,000 natives and outsiders are said to have died. In Dresden, where in the year 1635 only 79 persons had died in consequence of plague, there were 1,097 deaths in the year 1637. In the following years, moreover, cases of plague continued to appear. A high mortality prevailed even in the Saxon Erzgebirge, caused for the most part by typhus fever.

In Brandenburg a severe pestilence raged in the years 1637-8. Berlin was repeatedly attacked in 1637 and again in 1639. In Spandau it raged very extensively, and lasted well into the following year. In Luckau 500 inhabitants died in the year 1637. The pestilence was conveyed to Neu-Ruppin by an infected soldier, and in the church register of that town 600 deaths are recorded. In Gransee a pestilence broke out in May 1638, and in a short time carried away 1,000 persons. Four neighbouring villages were completely wiped out. In Wittstock 1,599 persons succumbed in the year 1638 to bubonic plague and other diseases, and in Pritzwalk 1,500 people died (not including the soldiers and fugitive country-people). In Lychen (district of Templin) numerous fugitives and two-thirds of the native inhabitants died. In Angermünde, but 40 out of 700 families were left, and in Prenzlau a pestilence likewise raged furiously.

Pomerania, while the war was going on between the Swedes and Imperialists, fared no better. In Massow 400 persons succumbed to a plague. In Ueckermünde, in conse-

quence of a plague caused by the capture of the city by the Swedes, only eight men and seven widows are said to have survived the year 1638.

Mecklenburg suffered terribly in the years 1637-8 from the quartering of Swedish troops there. Thousands succumbed in a short time to dysentery and bubonic plague, especially in the months of August and September 1638. Güstrow, in the year 1637, is said to have lost 2,000 persons (most of them doubtless fugitive country-people). Sternberg, the population of which was completely wiped out by the pestilence, stood empty for half a year. In New Brandenburg, where many country-people had taken refuge, 8,000 people died in the year 1638, according to the church register. Bützow had 261 deaths.

IV. THE WAR YEARS (1641-8)

After the death of Bernhard von Weimar and of Banner, all centralized warfare in Germany ceased, and there began an endless series of futile marches across the country. The great depopulation of Germany, the difficulty of properly nourishing the few that had survived, and the wide prevalence of camp-fever, made it impossible to carry out any more large enterprises. Severe pestilences scarcely ever occurred, for the simple reason that there were so few people to contract and spread diseases. Typhus fever had become epidemic everywhere. 'In Germany,' says Schnurrer,²⁰ 'where fighting had been going on for twenty-two years, and where soldier-life had almost supplanted civil and rural life, a certain war-plague revealed itself in places where there were soldiers, and where the war had left its vestiges. This war-plague was characterized by a mucous fever, began with a chill, accompanied by coughing, diarrhoea, and, in the case of women, by increased and irregular menstruation; at the same time the tongue became dry, headache and insomnia ensued,

²⁰ F. Schnurrer, *op. cit.*, vol. ii, p. 181.

and at the crisis either the brain or the throat became inflamed, or else petechiae or purpura (then for the first time observed in Lower Saxony) broke out. Moreover, this war-plague, if it appeared to have passed a crisis on the fourteenth or twenty-first day, manifested a remarkable tendency to relapse. It was quite as infectious as bubonic plague, and was called by several names—Hungarian fever, head-disease, and soldiers' disease.' We distinctly see in this description a mixture of various diseases (especially typhoid fever, typhus fever, and others). Schnurrer's authority was Lotichius, a Frankfurt physician.

The continuation of the war was disastrous to Austria, for the reason that the Swedish general, Torstensen, pressed on to Moravia and Lower Austria. As early as the year 1642 he had undertaken an expedition through Silesia to Moravia and Bohemia; in the year 1644 he advanced again, defeated the Imperialists at Jankau in Bohemia in the spring of the year 1645, and besieged (unsuccessfully) both Vienna and Brünn. In the year 1645 he was hard pressed by the Austrians and compelled to evacuate Moravia and Bohemia. Torstensen's campaigns resulted in the outbreak of severe pestilences throughout all Austria.

Bohemia had suffered as much as Germany from the hardships of the Thirty Years' War, while Austrian Silesia, and at times those parts of Austria which bordered on Bavaria, had not been spared. Only in the year 1634 was Austria itself attacked by pestilences, obvious consequence of the fact that both Saxony and Bavaria were badly infected. The incursion of Banner into Bohemia, in the year 1639, had likewise caused a widespread epidemic.

As far back as the year 1644, and hence before Torstensen's invasion of Austria, severe plagues broke out in Hungary, Croatia, Upper and Lower Austria, Styria, Carinthia, and Görz. People who contracted the disease usually died in the first three days. Torstensen's invasion caused the pestilence to spread very extensively. In Vienna it broke

out in August 1645, having been borne thither by Rakoczi's troops, and carried away from thirty to forty people daily. Tuln, St. Pölten, and New Vienna are also mentioned as places that were attacked. Styria was particularly afflicted in the year 1646; the district of Cilli is said to have lost 10,000 inhabitants, while the city of Cilli alone had some 400 deaths. In Graz, as in all Upper Styria, the loss of human life was not so great.

V. WAR PESTILENCES IN NON-GERMAN STATES DURING THE THIRTY YEARS' WAR

1. The Netherlands. In the summer of the year 1623 there raged in Mansfeld's camp in East Friesland an epidemic of typhus fever, which soon spread among the Netherlandish troops and over the Netherlands. Antwerp, Brussels, Ypres, Leyden, Delft, and Amsterdam were all severely attacked. In Leyden 9,897 persons died between October 1623 and October 1624. In Amsterdam 32,532 people died in the year 1624, 11,795 of them in consequence of the pestilence. In the year 1625, Breda, which for eight months had been defended by Flemish and Walloon troops in conjunction with the English and French, fell into the hands of the Spaniards; famine, pestilence, and scurvy had raged so furiously in the besieged city that 8,000 people died there, whereas the well-nourished Spaniards did not suffer at all from pestilence.²¹

In the years 1635-7 typhus fever and bubonic plague again made their appearance in the Netherlands. An epidemic of the latter occurred in Leyden in the months August-November 1635, and carried away 20,000 people in the course of the entire year. The pestilence caused great devastation in Nimeguen during the siege of the city by the French and Dutch; in the summer of 1635 dysentery and typhus fever broke out there, and in November bubonic

²¹ Lammert, *op. cit.*, p. 214.—H. Häser, *op. cit.*, vol. iii, p. 410.

plague appeared and slowly extended its area in the course of the winter. From April to October 1636 it raged furiously, and spared scarcely a single house; from August 1, 1635, to August 1, 1636, some 6,000 persons died in the city, and the pestilence did not come to an end until February 1637. It also spread to the country around Nimeguen, especially to Montfort, where half of the inhabitants succumbed to it.²¹

2. France. In the years 1620-30 a large part of the country was visited by pestilence, especially the southern provinces during the war of extermination that was carried on against the Calvinists. In Montpellier, after the siege in 1623, a virulent fever (*febris maligna pestilens*) raged for eight months, and carried away one-third of the people who contracted it. According to Lazarus Riverius the skin became covered with red, livid, or black spots, similar to flea-bites; they appeared between the sixth and ninth days, and developed for the most part on the loins, breast, and neck.²² In the years 1628-33 France experienced some very severe outbreaks of pestilence, which undoubtedly involved bubonic plague as well as typhus fever. Lyons had 50,000 deaths, Limoges 25,000, while Paris, Angers, Châlons, Aix, Montpellier, Avignon, Marseilles, Agen, Dijon, Vienne, Villefranche, and Toulouse were also attacked. In Montpellier, whither the pestilence had been borne from Toulouse, 5,000 people died between October 1630 and April 1631—almost one-half of the entire population. The city of Digne, where a plague broke out in 1629, had a terrible fate; it was completely surrounded by soldiers, in order to prevent the plague from spreading further, and by April 1630 some 8,500 out of 10,000 inhabitants had died.

3. Switzerland. The proximity of the scene of the war,

²¹ Diemerbroeck, *Peste de Nimègue*. Amsterdam, 1665. Quoted from A. Laveran, op. cit.

²² Ch. Murchison, *A Treatise on the Continued Fevers of Great Britain*. Quoted from the German translation by W. Zülzer. Brunswick, 1867. P. 25.—Ozanam, op. cit., vol. iv, p. 173.

which brought numerous fugitives into the country, and the marching back and forth of troops through the Grisons, resulted in numerous outbreaks of pestilence in Switzerland. In the year 1622 some 3,000 soldiers were carried away by an epidemic of typhus fever in the county of Mayenfeld. Pestilences raged extensively in Switzerland in the years 1628-9. On August 5, 1628, a plague broke out in Schaffhausen, reached its climax in October of that year, and carried away, all told, 2,595 persons; 2,000 people died in the country around Schaffhausen. In Zug a pestilence broke out in September 1628 and lasted until December 1629, carrying away 468 persons; in Sursee there were 600 deaths, in Sempach 100, in Frauenfeld 400. In Basel the number of deaths in the year 1629 was 2,656. In the same year St. Gall, Toggenburg, and Altdorf were severely attacked. In the year 1635 another pestilence broke out; the constant misery caused by the war, and the consequent famine, brought swarms of beggars and vagabonds from South Germany into Switzerland, which they infected with various diseases. The city of Zürich, for example, on June 14 of one year was compelled to drive out 7,400 beggars. All Switzerland was attacked by pestilence at that time, even the most out of the way valleys.

4. Italy was the scene of severe pestilences in the years 1629-31; according to Ozanam they were borne there by German troops, and according to Häser by French troops. At all events the outbreak occurred in connexion with the war which France was waging in Mantua against Austria and Spain over the succession. According to a Venetian physician, Grossi, the specific disease was not bubonic plague; Häser,²⁴ however, assumes that both typhus fever and bubonic plague occurred. Lammert seems to think that camp-fever in Upper Italy had little to do with the high mortality. Ozanam mentions buboes, plague-sores, inflammation of the salivary glands, and black and violet

²⁴ H. Häser, *op. cit.*, vol. iii, p. 404.

petechiae. Death is said to have occurred in from one to seven days. Brescia was first attacked; after the battle of Villabona (May 26, 1629), the pestilence, conveyed by retreating Venetian troops, spread throughout Upper and Central Italy. In Verona the number of deaths was 32,895, in Milan 86,000, in Venice (1630) 45,489, (1631) 94,164, in Mantua 25,000. In the territory of the Venetian Republic 500,000 persons are said to have succumbed to various pestilential diseases. Genoa, Turin, Padua, Bologna, Lucca, Florence, Parma, and other cities were also attacked. Regarding the outbreak of pestilence in Milan, Ozanam gives us no further information.²⁵ In October and November isolated instances of disease occurred among people who had acquired articles from German soldiers. Strict measures of precaution (burning of all effects, and quarantining of all persons who had come in contact with infected people) prevented the pestilence from spreading. But during the Carnival these measures were carried out less vigorously, and the result was that in the latter part of March 1630 a pestilence broke out in various quarters of the city. Accordingly, two more lazarets and 800 straw huts were erected outside the city, and shelter for relatives of the sick was provided. Notwithstanding this, the pestilence spread to such an extent that some 3,500 persons died every day. In Florence, Grand Duke Ferdinand II adopted energetic measures against the dissemination of the disease; infected people, with or against their will, were taken to the Hospital of San Bonifacio, where the physicians themselves were obliged to remain. Recovered patients were held in quarantine, and their clothes and other effects were burned. Some 9,000 persons are said to have succumbed to the pestilence in Florence.

5. In England typhus fever repeatedly broke out after the year 1622. In the spring of the year 1643 it appeared in the parliamentary army and in the royal garrison during

²⁵ Ozanam, *op. cit.*, vol. v, p. 18 ff.

the siege of Reading. The disease, which is described by Thomas Willis, spread from there to Oxford and the surrounding country.²⁸

VI. A GENERAL REVIEW OF THE LOSS OF HUMAN LIFE IN GERMANY DURING THE THIRTY YEARS' WAR

Even if it is impossible to give an accurate numerical account of the losses due to pestilence in the course of the Thirty Years' War, we have seen in a general way how epidemics of dysentery, typhus fever, and bubonic plague followed at the heels of armies, how they were borne from place to place, and how the devastation of the country caused by the war led to an absolute dearth of the necessaries of life, and thereby helped the pestilences to spread. We have mentioned only those places regarding which we have specific information, and they can be regarded only as examples of how these pestilences appeared; as a matter of fact, however, conditions were very much the same in all parts of the country. At the same time these examples show satisfactorily that the great depopulation of Germany during the Thirty Years' War was chiefly caused by severe epidemics of typhus fever and bubonic plague.

It will be of interest to assemble the figures (such as have been recorded) relating to the number of deaths that occurred in a few of the larger cities during the Thirty Years' War. We include Basel among those cities, since, being situated close to the border of that part of Germany where the war was carried on during two rather long periods, it was necessarily attacked by the prevalent pestilences. At the same time Basel affords an example of how quickly these pestilences disappeared from the cities, even in the seventeenth century, if external conditions permitted the authorities to take the necessary measures of prevention and precaution, and if the cities were not constantly being reinfected. We

²⁸ Ch. Murchison, *op. cit.*, p. 26.

give the total number of deaths, and merely remark that the population in all German cities in the course of the Thirty Years' War decreased considerably. In the case of Leipzig, Dresden, and Frankfurt-on-the-Main the still-births are included, but not in the case of Augsburg, Basel, and Strassburg. As a rule the country-people who fled to the cities are not included among the dead; only in the case of Strassburg, and perhaps also in that of Breslau for the year 1633, are they included.

The total loss of human life in the Thirty Years' War can be estimated only approximately. The statement attributed to Lammert, that the population of Germany, which amounted to sixteen or seventeen millions before the war, had dwindled down to four millions after the war, is perhaps an exaggeration. Other estimates state that Germany lost one-half of its population. In the case of a few states we have more exact figures, which probably approach more closely to the actual loss. Thus the electorate of Saxony, which was much larger in area than the modern kingdom of Saxony, in the years 1631-2 is said to have lost some 934,000 persons. The population of Bohemia is said to have decreased during the Thirty Years' War from three millions to 780,000. In Bavaria 80,000 families are said to have been wiped out. The population of Württemberg decreased from 444,800 in the year 1622 to 97,300. The population of Hesse decreased by about one-quarter. So much, however, is sure: that in the regions where the war was carried on for several years the population decreased by far more than one-half. The most positive proof of this is afforded by the hundreds of burned-down and unrebuilt houses found in so many German cities, and the numerous unpeopled, or almost unpeopled, places which Germany had to show at the end of the war.



DEATHS (1618-48).

Year.	Leipzig. ²⁷	Dresden. ²⁸	Breslau. ²⁹	Augsburg. ³⁰	Frankfurt. ³¹	Strassburg. ³²	Basel. ³³
1618	422	400	1,205	1,354	625	1,343	535
1619	569	332	1,313	1,485	544	1,258	257
1620	477	472	1,456	1,667	670	996	259
1621	613	491	1,652	1,517	674	1,019	352
1622	580	381	1,045	1,959	1,785	4,388	450
1623	500	421	1,050	1,875	725	1,738	336
1624	812	411	1,260	1,370	955	1,491	297
1625	718	481	3,000	1,392	1,871	1,350	297
1626	1,268	740	1,874	2,440	963	2,500	330
1627	537	412	1,227	2,494	773	1,609	266
1628	388	469	1,020	3,611	680	1,513	527
1629	506	398	1,116	1,265	832	1,786	2,656
1630	881	480	1,156	909	927	1,425	220
1631	1,754	844	1,795	859	1,132	1,383	221
1632	2,789	3,129	1,395	3,485	2,900	2,675	284
1633	1,445	4,585	13,231	3,364	762	5,546	456
1634	306	721	1,010	4,664	3,512	—	2,115
1635	603	597	949	6,243	6,943	—	560
1636	1,218	594	873	790	2,301	—	600
1637	4,229	1,897	1,060	823	3,152	—	424
1638	552	531	863	638	1,079	—	527
1639	955	1,845	928	674	948	1,923	515
1640	469	935	1,273	586	1,034	—	239
1641	482	525	1,088	887	735	713	195
1642	1,080	601	1,343	593	883	680	242
1643	1,034	1,041	1,332	638	523	—	532
1644	604	489	1,570	659	491	707	337
1645	458	532	1,133	758	678	—	220
1646	331	481	1,042	1,488	774	651	205
1647	403	471	1,273	1,338	662	573	238
1648	469	606	1,111	1,208	575	643	235

²⁷ Figures published by the Leipzig Bureau of Statistics in 1872; prior to 1629 they cover the governmental years of the successive burgomasters, but from 1630 on, they cover the calendar years.

²⁸ Only the Protestant population, including sixteen villages annexed to Dresden, *Stat. Jahrbuch der Stadt Dresden*, Jahrgang 1902. P. 17.

²⁹ Dr. J. Grützer, *E. Halley und C. Neumann*. Breslau, 1888. P. 89. Including only the deceased supporters of the Augsburg Confession.

³⁰ According to a written compilation made out by Dr. E. Rösle in Dresden. Taken from the reference material in the Augsburg Archives.

³¹ A. Dietz, *Frankfurter Bürgerbuch*. Frankfurt-on-the-Main, 1897. The Catholics are only partially included, the Jews not at all.

³² Ch. Boersch, op. cit., p. 167.—Krieger, *Beiträge zur Geschichte der Volks-seuchen*. *Stat. Mitteilungen über Elsass-Lothringen*, fascicle 10.

³³ A. Burekhardt, *Demographie und Epidemiologie der Stadt Basel während der letzten drei Jahrhunderte, 1601-1900*. Leipzig, 1908.

CHAPTER IV

THE PERIOD BETWEEN THE PEACE OF WESTPHALIA AND THE FRENCH REVOLUTION

(a) CENTRAL EUROPE

THE Thirty Years' War left Germany for several decades in such a weakened condition that Louis XIV was able to perpetrate all sorts of outrages upon the unfortunate country. The result was a series of protracted conflicts in the countries on the Rhine. The German Emperor, however, was unable to fight with much vigour, partly because of disruption in the interior of the German Empire, and partly because the advancing Turks were gravely menacing its eastern boundary. After Louis XIV had come to terms with Holland in the Peace of Nimeguen (1679), in order to secure for his protégé the Archbishopric of Cologne, which was then vacant, he invaded Germany without declaring war, and his troops committed horrible devastations in the Palatinate and in northern Baden. A German army was organized to oppose the French, but it accomplished very little. Regarding the pestilences of that time not much is known, although it is certain that typhus fever was present in the armies. Thus we learn from a physician named R. Lentilius¹ that in November 1689, 'burning head-disease' or 'Hungarian disease' was disseminated by Bavarian soldiers who, under Max Emanuel, had taken part in the successful siege of Mayence (ending on September 11), and who afterwards returned home to pass the winter. Typhus fever was conveyed by them to Gundelfingen, Lauingen, Höchstädt, Donauwörth, and Wendingen (all of them places on the Danube between Ulm and Ingolstadt), causing a great many

¹ Rosini Lentilii *Miscellanea medico-practica tripartita*. Ulmae, 1698. Vol. ii, p. 435 ff.

deaths. In many places—for example, in Gundelfingen—the epidemic lasted well into the following year.

In the very first year of the War of the Spanish Succession (1702–14) Augsburg suffered terribly from camp-pestilences, which also spread among the non-belligerent population. In the year 1703 the city was occupied by the French and Bavarians fighting as allies, and was afterwards besieged by the Imperialists and the English.² The number of deaths in Augsburg (excluding the still-births) was :

1701	.	.	.	.	.	.	906
1702	.	.	.	.	.	.	900
1703	.	.	.	.	.	.	1,245
1704	.	.	.	.	.	.	3,113
1705	.	.	.	.	.	.	748
1706	.	.	.	.	.	.	842

Seitz reports that the troops along the Rhine were again infected with petechial fever in the year 1712; Metz, on the other hand, expressly says that no pestilences occurred at that time.

In the year 1733 a conflict again broke out between France and Germany over the Polish succession. In the year 1734 typhus fever appeared along the Rhine; in the spring and summer the outbreaks were sporadic, but in the fall, when troops were stationed along both sides of the Rhine, a virulent typhus broke out in many places, as in Heidelberg, Heilbronn, and Germersheim; the disease was borne even to Lorraine by French troops returning from the siege of Philippsburg.³

In connexion with the War of the Austrian Succession (1741–8), which Maria Theresa waged in conjunction with England and Hanover against Prussia, Bavaria, Saxony, France, and Spain, we know of several outbreaks of pestilence. In the year 1742 Bavaria was overrun by Austrian troops; a severe pestilence broke out in that year in Ingolstadt and carried away several thousand of the strong

² F. Seitz, *op. cit.*, p. 85.

³ *Ibid.*, p. 105.

French garrison there. A large number of civilians also died.⁴ It is stated that the French garrison at Amberg lost 1,200 men, and that 400 of the inhabitants perished; it is very probable that the specific disease was typhus fever.

An unusually severe epidemic broke out in the year 1742 in Prague; on November 26, 1741, the city was stormed by the Bavarians and French, and shortly afterwards it was besieged by the Austrians under the Grand Duke of Tuscany. The number of men in the French garrison was 13,000, and the siege lasted until December 25, 1742. Almost all the French physicians and surgeons died; on the bodies of the inhabitants of the city appeared petechiae, which, it is stated, were not observed among the French. All told, 30,000 people are said to have been carried away by the epidemic in Prague. The high mortality was due to the wrong treatment of the disease by the French physicians, who held it to be inflammatory and sought to cure it by means of drastic phlebotomy. 'Cette grande mortalité,' says Ozanam, 'fut attribuée au traitement suivi par les médecins français, qui, malgré l'avis de ceux du pays, saignaient les malades jusqu'à ce qu'ils expirassent sous la lancette, et par l'abus qu'ils firent de l'émétique qu'ils administrèrent jusqu'au 7^e, 8^e, 9^e, et 10^e jour.'⁵ (The high mortality was due to the treatment given by the French physicians, who, despite the advice of the local physicians, bled the patients until they expired under the lancet, and overdosed them with emetics as far along as the seventh, eighth, ninth, and tenth day.) The Prussian army in Silesia was also infected with typhus fever, and it was not long before all the corps and the native population were attacked.⁶

The Austrian and English army, the so-called Pragmatic army, which in the year 1743 operated in the region of the

⁴ F. Seitz, *op. cit.*, p. 110.

⁵ Ozanam, *op. cit.*, vol. iv, p. 206.—Häser, *op. cit.*, vol. iii, p. 478.

⁶ Ozanam, *op. cit.*, vol. iv, p. 207.

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Main, and which on July 27, 1743, won a victory at Dettingen (near Aschaffenburg), suffered severely, according to Pringle⁷, from dysentery and hospital fever. The hospital for the English army was situated in the village of Fechenheim (near Hanau); all the patients sent there, even those who had some mild form of sickness, were infected with a camp-fever, which according to the description must have been typhus fever, and almost one-half of them died. The inhabitants of the village were also attacked, and nearly all of them succumbed. According to Neuwied, the disease was brought there in the evacuations of the sick and carried even to England by returning English soldiers.

The Seven Years' War was attended by several epidemics of typhus fever. Notwithstanding the long duration of the war, they did not become very widespread, inasmuch as the armies were comparatively small, and as the scene of the fighting, in accordance with the military tactics of Frederick the Great, who opposed first one and then another Power, kept changing, and thus caused no one region to suffer for any great length of time. A severe epidemic of typhus fever broke out in Silesia in the year 1758; it raged in both the Austrian and Prussian armies, and spread to many places, for example, to Breslau, Schweidnitz, and Landshut, where the civil inhabitants also became infected. In Breslau, according to Grätzer,⁸ the number of deaths among the evangelical population was:

1756	.	.	.	.	.	.	1,375
1757	.	.	.	.	.	.	1,554
1758	.	.	.	.	.	.	4,088
1759	.	.	.	.	.	.	1,697
1760	.	.	.	.	.	.	1,590
1761	.	.	.	.	.	.	1,724
1762	.	.	.	.	.	.	2,373
1763	.	.	.	.	.	.	1,808

⁷ J. Pringle, loc. cit.

⁸ Dr. J. Grätzer, loc. cit.

According to Süssmilch,⁹ the number of deaths among the Catholics in the year 1758 was 5,135; thus the total number of deaths in the entire civil population was 9,223. In addition, the following military persons were buried: 5,470 Prussian soldiers, 2,153 Austrian soldiers, 18 Swedish soldiers; also 755 wives and children of soldiers, and 953 paupers and outsiders. The total number of interments in Breslau in that year was 18,572. The great mortality lasted from January to June; of 9,349 military persons buried, there died in:

January	1,346
February	1,709
March	1,246
April	940
May	1,287
June	818
July	457
August	578
September	383
October	201
November	164
December	220

In the year 1757, in which there was a high mortality in a large part of North Germany that was unaffected by the war, there was an unusually large number of deaths in Dresden; in the year 1760, when the city was beleaguered by Frederick the Great, a 'virulent epidemic fever' broke out and again caused a great increase in the death-rate. The number of deaths in Dresden (excluding the still-births) was:¹⁰

1756	2,432
1757	4,454
1758	2,603
1759	2,631
1760	3,514
1761	2,127
1762	2,008
1763	1,975

⁹ J. P. Süssmilch, *Die göttliche Ordnung u. s. w.* Vol. i, p. 816. (Fourth edition. Berlin, 1788.)

¹⁰ *Statistisches Jahrbuch für die Stadt Dresden, Jahrgang 1902.*

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The increased number of deaths during the Seven Years' War in the countries where the fighting took place is shown by the following figures (which include the still-births) for Berlin and Leipzig :

Year.	Leipzig ¹¹ (total no. deaths).	Berlin ¹² (deaths per 1,000).
1755 . . .	1,150	34.5
1756 . . .	1,286	42.0
1757 . . .	2,600	49.2
1758 . . .	2,870	56.4
1759 . . .	1,700	43.5
1760 . . .	2,000	41.6
1761 . . .	1,400	38.2
1762 . . .	2,160	48.0
1763 . . .	1,614	50.3
1764 . . .	1,052	30.3*

Typhus fever also appeared in the western scene of the war, where the Imperialist and French troops were fighting against the Prussians. When the united Imperialist and French armies besieged Eisenach for two weeks, the disease broke out in both military hospitals in the city and afterwards spread among the inhabitants, causing many deaths.

(b) EASTERN EUROPE

During the numerous wars that were waged in eastern Europe in the course of the seventeenth and eighteenth centuries, epidemic diseases frequently made their appearance. After the siege of Vienna (1683), typhus fever broke out in various parts of Hungary, particularly in Pressburg, where many soldiers were congregated. The disease spread from the soldiers to the civilians, and the pestilence lasted from November 1683 to the spring of 1684. After the return of the Prussian troops from Hungary, typhus fever broke out in many parts of Germany; for example, in Minden.¹³

¹¹ Figures published by the Leipzig Bureau of Statistics in 1872.

¹² Year-book of Statistics for the City of Berlin.

¹³ Ozanam, *op. cit.*, vol. iv, p. 181 ff.

At the beginning of the eighteenth century bubonic plague broke out in Constantinople and spread from there to the Lower Danube countries and to Russia, particularly to Ukraine. According to Hecker,¹⁴ this dissemination was greatly furthered by the adventurous campaign of Charles XII of Sweden, so that the epidemic included all eastern Europe and gradually embraced north-western Germany and Sweden. Fleeing Swedish and Polish soldiers, after the battle of Pultowa (July 8, 1707), conveyed the disease to Silesia. Danzig was severely attacked in that year, and a few cases occurred there in the year 1708; but in the following year a very severe pestilence broke out, reached its climax in September, and between January 5 and December 7, 1709, carried away 32,599 persons. From Danzig the plague spread to Courland, Livonia, Pomerania, Denmark, and Sweden. In Copenhagen 20,822 persons died in the year 1710, in Stockholm 40,000, in Karlskrona 16,000.

In the years 1716-18, when Austria and Turkey once more came to blows over the Turkish occupation of Morea, which belonged to the Venetians, bubonic plague broke out in Constantinople and also among the Turks who were shut up in Belgrade. The Austrian army, which was encamped outside of Belgrade, was apparently not attacked by that disease, although some 4,000 men succumbed to intermittent fever, head-disease, and dysentery.¹⁵

During the war waged by Russia and Austria against Turkey (1736-9), bubonic plague appeared along the Lower Danube. 'It broke out there,' says Häser,¹⁶ 'first during the war waged by Austria and Russia against Turkey, and the result was that the war was terminated unexpectedly, and in a manner unfavourable to the Christian arms. At the time of its appearance in Ukraine (July 1738) the disease

¹⁴ Häser, *op. cit.*, vol. iii, p. 454.

¹⁵ *Ibid.*, vol. iii, p. 459.

¹⁶ *Ibid.*, vol. iii, p. 481.—Hammer, *Geschichte der Pest, die vom Jahre 1738 bis 1740 im Temeswarer Banate herrschte*. Temesvar, 1889. (Quoted from Häser.)

was conveyed by Austrian troops to Temesvar; from there it gradually spread over all Hungary, mostly along the banks of the Theiss to the boundaries of Carniola, Moravia, and Austria, and also along the Carpathian Mountains to Poland and Bukowina. The devastation caused by the pestilence continued for seven years, and the measures adopted by the authorities proved of little or no avail.

The severe epidemic of bubonic plague during the Russo-Turkish War of 1769-72 has been carefully investigated by Hecker.¹⁷ The Turkish army, in consequence of inferior nourishment, was badly infected with intermittent fever, dysentery, and typhus fever when it set out from Constantinople in March 1769. When the Russian troops advanced, the Turks retreated after an engagement near Galatz. Since the disease had been conveyed on ships from Constantinople to Galatz, where many Russians succumbed to it, the city was evacuated. On the way to Jassy every trace of the pestilence disappeared, and in Jassy the soldiers were quartered in the houses of the citizens. Since patients suffering from contagious diseases had not been isolated in the military hospitals there, in the middle of January typhus fever broke out in them, accompanied by glandular swellings in the groin. Four weeks later a Jew and his two children were taken sick in the city and died, the Jew having bought a fur coat in the hospital. Since the Russian commander-in-chief did not hold the disease to be bubonic plague and did nothing to prevent it from spreading, in March 1770 it spread far and wide in Moldavia and Wallachia. Not until the end of April was the presence of bubonic plague officially admitted; and then the well-qualified physician Orraeus was commissioned to make an investigation.

From Jassy the disease was conveyed to Botoshany, which also lies in northern Moldavia, and there it soon developed into a severe epidemic and carried away more than 800 out of the town's 2,500 inhabitants; the rest fled to Carpathia.

¹⁷ J. F. C. Hecker, *Geschichte der neueren Heilkunde*. Berlin, 1839.

'The patients,' says Hecker,¹⁸ 'lay in tents, and without care or medical help awaited an almost certain death. The city itself afforded a sight of complete disorder; the houses were deserted and stood with open windows and doors, the air was poisoned with the odour of accumulated refuse, and the general devastation bore silent witness to the most extreme misery. In addition to that, there were multitudes of savage, ravenous dogs, which dug up the dead and menaced the sick.'

Conditions were just as bad in Jassy when Orraeus arrived there on May 10; of the inhabitants and of the Russian garrison more than half had died, while many streets were entirely depopulated. Since the persons infected with the disease were placed out in a near-by forest, where they were left without care, many patients were concealed inside the houses and their bodies afterwards secretly buried in gardens and cellars. There was no medical help, since both of the Greek physicians had fled from the city. On May 20 the Russian troops, at the instigation of Orraeus, withdrew from Jassy; a convent was converted into a hospital, and soon after that the pestilence began to subside. By June 22 it had disappeared.

In Wallachia the disease broke out somewhat later than in Moldavia, and with considerably less severity. In Bucharest it lasted until May.

In Bender, situated in Bessarabia on the Dniester, there was a mild epidemic of bubonic plague after the city had been stormed on September 16, 1770. The carrying-off of war-booty caused new pestilences in the army and in the population of Podolia and Little Russia. For a short time in the last part of September the main army also suffered from plague in its fixed quarters on the Pruth.

The Turkish army, which passed the winter in Bulgaria, was severely attacked by plague, but no further information about this outbreak is available.

¹⁸ J. F. C. Hecker, *Geschichte der neueren Heilkunde*. Berlin, 1839, p. 11.

In February 1771, Moldavia and Wallachia suffered very little from plague, although there were occasional outbreaks here and there (for example, in Bucharest) until the year 1773; but these were always of short duration.

The transplantation of this disease into neighbouring countries, especially Russia and its capital, was of particular importance. In consequence of the widespread occurrence of bubonic plague in Moldavia and Wallachia when the war broke out in the spring of 1770, large numbers of fugitives from those parts gathered along the border of Transylvania, where a quarantine establishment was opened at Törzburg (south-west of Kronstadt). In Rukur, a border-village of Wallachia, whither large numbers of people fled daily, a Jewess succumbed at the end of April to bubonic plague, and in the course of the next eight weeks 60 more people died. From there the pestilence spread to neighbouring localities, in which 615 out of 3,000 inhabitants (including 31 outsiders) died. The climax of the plague was in September. It gradually spread throughout the border-towns of Transylvania, but only in occasional instances did it reach the interior of the country; all told, there were 1,024 deaths from the pestilence in Transylvania in the year 1770.

Since all the supplies of the Russian army were conveyed to it on Polish wagons, Polish peasants contracted the disease in the infected countries, and then spread it throughout Poland. Jewish pedlars, who purchased clothes, furs, and war-booty in the Russian camp, likewise helped to spread the disease. In Poland the plague became unusually widespread, particularly in Podolia, Volhynia, and in the eastern part of Galicia; 47 cities and 580 villages, according to Chenot, were attacked, and 275 of the latter were almost completely wiped out. The total loss in these regions is estimated at 250,000. But the disease penetrated no further into Poland, and Warsaw did not suffer at all.

Southern Russia was attacked later than Poland—not

until August 1770. Kiev was the first of several cities in which the plague broke out; the disease, which was borne there on infected wares from Podolia, carried away 20,000 people, about one-fifth of the population of the city. Fugitives from Kiev conveyed the pestilence to many cities and villages in Little Russia, while troops returning from Bender helped to spread it in the north. In Nieskin, a city in Ukraine, the plague caused horrible devastation; it broke out there for the second time in the year 1771, and carried away from 8,000 to 10,000 people.

It was generally believed that the severe epidemic of bubonic plague which raged in Moscow in the year 1771 was directly connected with the expedition against the Turks. At that time the city had some 230,000 inhabitants; the streets, full of filth, were narrow, and the houses, most of which were one-story wooden structures, stood close together. According to Hecker, the beginning of the plague is obscure; fugitives from the scene of the war, and wool imported from Poland or Ukraine are both given as the original means of dissemination, but inasmuch as the disease was so widespread in the south, it is probable that it was conveyed to the north in various ways. Schafonsky, writing in Russian, described the plague in an excellent book, of which Hecker made use; the description by a surgeon named Samoilowitz,¹⁰ who did good service during the plague, contracted the disease himself, and was roughly treated in a revolt, according to Hecker lacks scientific merit and is unreliable. In November and December, 1770, there were a few suspected cases in a hospital in the eastern part of the city; Schafonsky diagnosed the disease as bubonic plague, while the medical officer of the city called it typhus fever. By means of strict isolation and other measures this outbreak was soon entirely checked. As early as

¹⁰ D. Samoilowitz, *Mémoire sur la peste qui, en 1771, ravagea l'empire de Russie, surtout Moscou*. Paris, 1783. (A German translation appeared in Leipzig in 1785.)

January and February, however, indubitable cases of plague had occurred, but they were kept secret. The epidemic really began in the Imperial cloth-manufactory, where 3,000 working-men were employed; not until 130 people had died within eight weeks, was this fact made known on March 9, 1771. Since many of the working-men lived in the city and had meanwhile conveyed the disease to their homes, the measures of prevention came too late. The patients were now taken to a convent in Ukresh (near Moscow), while all the rest of the employees were quarantined. But these measures merely helped to spread the disease, since many of the working-men, in order to escape being quarantined, fled and concealed themselves in the city. When it became known that bubonic plague was present in Moscow, the nobility fled to the country. The people themselves refused to listen to any advice; nobody believed in contagion, and in September there was actually a revolt in the city against the measures that had been adopted to check the epidemic. The compulsory confinement in hospitals of infected people and the quarantining of their families led to numerous concealments. In July the pestilence had already become very widespread; many houses in the suburbs were empty, the courts of justice and workshops were closed, and, since nurses and grave-diggers were dying off rapidly, convicts were employed to do their work. In the southern part of the city a convent was converted into a hospital, and at the end of July only one attendant was on hand there to take care of 1,000 patients. The epidemic reached its climax in September, when from 600 to 1,000 persons died every day. By January 1772, the pestilence had disappeared. From the month of April 1771 on, the number of people that contracted the disease and the number that died were officially recorded; the number of deaths (excluding the bodies buried in secret) was:

<i>Months.</i>	<i>Total no. deaths.</i>	<i>Deaths in Hospitals.</i>
April (1771) . . .	778	—
May	878	56
June	1,099	105
July	1,708	298
August	7,268	845
September	21,401	1,640
October	17,561	2,626
November	5,235	1,769
December	805	456
January (1772) . .	330	—

The number of deaths, which at that time averaged 7,000 per annum in Moscow, thus increased to 58,000 (including some 1,000 secret burials), and at least 52,000 were directly due to the epidemic. About 150 priests were victims of their calling.

During the pestilence there was constant intercourse between Moscow and the surrounding country, since the necessities of life had to be brought to the city, where clothes and household goods were to be bought very cheaply. Thus most of the villages and cities in the surrounding country were infected. Some of the latter were almost completely depopulated, while the estate-owners found protection by shutting themselves up in their manors. Of the more distant cities Jaroslav-on-the-Volga was very severely attacked, while Borowsk, Kaluga, and Tula suffered somewhat less. St. Petersburg was the only city to prohibit outsiders from entering, and it was consequently spared.

CHAPTER V

THE PERIOD BETWEEN THE FRENCH REVOLUTION AND NAPOLEON'S RUSSIAN CAMPAIGN

THE twenty years of fighting that followed the French Revolution, and into which all Europe was drawn, were everywhere accompanied by outbreaks of pestilence, many of which were very serious. At the very beginning of the first Coalition War (1792-7) they played an important rôle. A severe epidemic of dysentery broke out among the Prussian troops when they were advancing into Champagne, and this was chiefly responsible for the failure of the invasion. Typhus fever had also appeared and caused a great many deaths among the Prussians, as well as among the inhabitants of the Departments of Meuse, Moselle, Meurthe, and Ardennes.¹ When the badly infected army of the Allies retreated, after the engagement at Valmy (September 20, 1792), it left behind its sick in various cities and villages, and thus infected the French army that followed in pursuit. In Longwy itself (which had remained in the power of the Allies until October 22), and in the immediate vicinity, the streets were filled with the bodies of soldiers who had succumbed, partly to exhaustion, and partly to dysentery.²

Verdun suffered terribly during the siege of the Allies, and at the end of August was obliged to surrender. The chief cause of the widespread occurrence of disease there was the fearful lack of sanitation; 'à Verdun,' say Maréchal and Didion³ 'une des causes les plus puissantes d'infection était le dépaupement de la ville au moment du siège. Tous les jours on jetait de chaque maison au milieu de la rue des

¹ H. Häser, *op cit.*, vol. iii, p. 538.

² Maréchal et Didion, *op. cit.*, p. 284.

³ *Ibid.*, p. 287.

immondices de toute espèce, des déjections humaines et animales, des débris, des végétaux, qui se mêlant à la boue se liquéfiaient et se putréfiaient par l'action des pluies. Les agents de la ferme des boues ne pouvaient rien contre tel foyer. Il s'en échappait une odeur infecte, quand quelque voiture venait à passer, et l'on voyait souvent des personnes frappées de spasmes, prises de vomissements et même asphyxiées en traversant les rues.' (One of the most potent causes of the infection at Verdun was the unpaved state of the town at the time of the siege. Every day refuse of all kinds was thrown from each house out into the street—the evacuations of men and animals, rubbish, and garbage—and there it mixed with the mud, liquefied and rotted through the action of the rain. The officials in charge of street sanitation were powerless. All this filth emitted a foul odour when a carriage drove through it, and one often saw people seized with convulsions and sickness, or even suffocated while crossing the streets.) There was no more thought of taking proper care of the sick and wounded in Verdun at that time, than there was in the later French wars; they lay in numbers on rotten straw, in their own excrement, two or three of them sharing a single blanket. The result was that two-thirds of the patients died.

Pont-à-Mousson, where three military hospitals were erected, also had a severe epidemic, as did Metz; the hospitals could not accommodate the many patients that came streaming in from all directions. Typhus fever continued to appear sporadically in the next two years; from 1792 to 1795 as many as 64,413 patients were received into the Metz hospitals, and of that number 4,870 died.

In the years 1793-4 typhus fever was frequently conveyed into Germany in consequence of the warfare along the Upper Rhine. In May 1793, it was brought to Frankfurt-on-the-Main by French prisoners-of-war, whom the Austrians on their march through the country had left behind. In addition

to the cases of 'putrid fever' in the military hospitals, a few cases were also observed in the city; until November the disease raged extensively, but in the winter it increased in fury and did not disappear until the summer of 1794. 'The descriptions of putrid fever,' says L. Wilbrandt,⁴ 'while they make no mention of exanthema, nevertheless positively prove that the disease was none other than exanthematic typhus, war-typhus. The facts that the disease described was highly infectious, and that it is expressly stated that diarrhoea was not observed, lead us to this conclusion.' In the report of the health-officer, issued at the end of July 1793, it is nevertheless asserted that 'the disease was of a putrescent nature, involving spots and purpura'. The transportation of French prisoners caused the epidemic to spread to Günthersburg and from there to Bornheim, but only in a mild form.

A short article by Canz⁵ informs us about the spreading of typhus fever from the Rhine to the Black Forest. The disease was borne by French prisoners to Hornberg near 'Triberg', where in the autumn of 1793 they spent four weeks. Owing to numerous outbreaks of 'infectious nerve-fever', a war-hospital for such patients was established at Hornberg, which had some 1,000 inhabitants. In November the first patients appeared in the town, and the epidemic lasted until the beginning of June of the following year; scarcely a single house was spared, especially among the poor, and often entire families contracted the disease. All told, sixty people died, including eight outsiders who had been brought to the hospital. According to Canz, infectious nerve-fever also made its appearance in Kinzigtal, in the Rhine region, and in several parts of Swabia. 'In some cases,' he says,

⁴ L. Wilbrandt, *Die Kriegslazareite von 1792-1815 und der Kriegstyphus zu Frankfurt am Main*. Arch. für Frankfurts Geschichte und Kunst, N. F., Vol. xi, p. 29. 1884.

⁵ G. E. F. Canz, *Beschreibung einer Schleim-, Faul-, und Nervenfieber-epidemie, die im Winter und Frühjahr 1793-4 in der Rheingegend und auf dem Schwarzwald unter dem Landvolk gewüthet*. Tübingen, 1795.

'pctechiae appeared between the fifth and eighth days on the breast, arms, and back; at first they were very small and rose-red, but later they turned yellow, brown, and finally blue and black, occasionally taking the form of large blue blotches, like suggilations.'

French prisoners also conveyed typhus fever to Bavaria. According to Seitz,⁶ this was the case, for example in Regensburg, where the disease raged furiously in December 1793. 'There is no doubt,' he says, 'that the germ of this disease was brought there by French captives, since many contracted the disease and succumbed to it on the transport-ships on which they were carried; and Schäffer (a physician in Regensburg) also saw many people contract the fever who had come in contact with them.' Typhus fever was disseminated all along the Danube—Donauwörth, Neuburg, Ingolstadt, Vohburg, Kehlheim, Donaustauf, Pfatter, Straubing, Deggendorf, and other places. Kulmbach was also infected by the French soldiers.

During the Coalition War violent conflicts took place in western France in the Vendée, where the Royalist population had risen against the new potentates. When Nantes was besieged by the Royalists in 1793, a furious outbreak of typhus fever occurred in that city.⁷ The prisons and hospitals were greatly overcrowded, the city was filled with dirt which nobody took the trouble to remove, and many carcasses were left unburied. In the latter part of September the disease broke out in the prison of Saintes-Claire, where the prisoners were very closely packed together. According to le Borgne, the official inspector said of this prison: 'Tout manquait dans cette maison—l'air, l'eau, les aliments, les remèdes, tout jusqu'aux moyens d'ensevelir et d'enterrer les morts.' (Everything was lacking in the building—air, water, food, remedies, and even the means for covering and burying

⁶ F. Seitz, op. cit., p. 125.

⁷ G. le Borne, *Recherches historiques sur les grandes épidémies qui ont régné à Nantes depuis le 6^e jusqu'au 19^e siècle*. Nantes, 1852.

the dead.) Without beds, without even straw, the prisoners had to lie on the damp ground and be scantily fed on bad bread and water. Regarding the Le Bouffay Prison, we read : ' Des morts, des mourants, et des prisonniers nouvellement infectés gisent sur le même grabat ! Les cachots répandent des miasmes putrides, et les lumières s'éteignent lorsqu'on entre dans ces cloaques empestés ! ' (Dead, dying, and recently infected prisoners lie on the same pallet ! The cells reek with putrid miasma, and the lights go out when one enters these pestilential sewers.) And regarding the L'Entrepôt Prison we read : ' La maladie était si intense à L'Entrepôt que, de 22 sentinelles qui y montèrent la garde, 21 périrent en très peu de jours, et que les membres du Conseil de salubrité, qui eurent le triste courage d'y aller, en furent presque tous les victimes.' (The disease was so intense at L'Entrepôt, that twenty-one out of twenty-two sentinels who went on duty there died within a very few days, and almost all the members of the Board of Health who had the sad courage to go there fell victims to it.) The hospitals were so crowded that three or four persons were obliged to occupy the same bed. After December the disease also spread to the city ; of 300 grave-diggers employed by the Revolutionary Committee, the majority were taken sick and many died. The total number of deaths in the city and in the prisons was estimated at 10,000.

In Italy very severe pestilences spread in a very short time over the entire peninsula, and even to Sicily, in consequence of the war that had been going on there since 1796. These pestilences were unusually severe in both camps during the siege of Mantua (1796-7). (We shall learn more about this in the tenth chapter.) In the year 1799 the French troops under Scherer were forced to retreat in disorder before the victorious advance of Suvarov and the Austrians, and they took refuge in Nice. There, in the autumn of 1799, a severe epidemic of typhus fever broke out in the French army and soon spread to the non-belligerent population, one-third of

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which was carried away by it.⁸ In consequence of the removal of the patients the disease was conveyed into southern France, infecting Aix, Fréjus, Marseilles, Toulon, and even Grenoble.⁹

The disease spread much more widely in the direction of Italy, where it soon attacked the entire coast of Liguria. A terrible epidemic of typhus fever occurred in Genoa in 1799-1800, when 14,000 people succumbed within six months.¹⁰ Rasori had noted the first cases as early as the summer of 1799; the patients were fugitives from Upper Italy, commercial travellers and military persons. Not until the end of the winter and in the spring did the disease become very widespread; it attacked principally the poorer people. Rasori held the disease to be 'nosocomial fever' (typhus fever), and his description of it makes this diagnosis seem undoubtedly correct. Regarding the increased prevalence of typhus fever during war-times, we are informed by the following table of deaths, compiled by Ozanam:¹¹

Year.	Deaths in Hospital.	Deaths in City.
1794	392	812
1795	477	911
1796	761	1,000
1797	1,038	900
1798	549	803
1799	489	809
1800	705	1,100
1801	929	1,200
1802	519	1,006
1803	404	1,036
1804	418	1,087

We note the increase in the year 1796, then the decrease when the war was interrupted in the year 1798, and the renewed increase when it began again.

⁸ Häser, op. cit., vol. iit, p. 536.

⁹ Ozanam, op. cit., vol. iv, p. 251.

¹⁰ G. Rasori, *Geschichte des epidemischen Fiebers, das in den Jahren 1799-1800 zu Genua geherrscht hat.* Translated from the Italian. Vienna, 1808.

¹¹ Ozanam, op. cit., vol. iv, p. 291.

Likewise in southern Germany various epidemics of typhus fever broke out during the second Coalition War (1799-1802), and they too were caused by the war and the constant marching back and forth of soldiers. Many places in Bavaria and Swabia were also attacked in the year 1799.¹²

A very severe epidemic of typhus fever broke out in connexion with the war between France and Austria in 1805; it devastated all Moravia, Bohemia, Upper and Lower Austria, Galicia, and Hungary. After the battle of Austerlitz (December 2, 1805) hospital fever appeared among the wounded in Brünn, and carried away hundreds of French, Russian, and Austrian soldiers. The pestilence soon spread among the non-belligerent population, which in the months January-May 1806, suffered terribly. According to Hain,¹³ the number of deaths in Austrian Silesia was :

July (1805)	.	.	.	.	3,965
August	.	.	.	.	3,945
September	.	.	.	.	4,204
October	.	.	.	.	4,735
November	.	.	.	.	4,410
December	.	.	.	.	4,501
January (1806)	.	.	.	.	16,399
February	.	.	.	.	14,588
March	.	.	.	.	14,140
April	.	.	.	.	10,971
May	.	.	.	.	9,087
June	.	.	.	.	6,292

In Vienna, which on November 13, 1805, had been occupied by the French, a severe epidemic of typhus fever soon broke out in consequence of the overcrowded condition of the hospitals. The transportation of so many prisoners of war, particularly Russians, along the military roads to Strassburg, caused the germ of typhus fever to be scattered along the entire route; Landshut, Munich, and Augsburg are three

¹² Seitz, loc. cit.—J. N. Feichtmayer, *Beitrag zur Geschichte des in einem Teile von Schwaben und auch in unserer Gegend häufiger als sonst gewöhnlich herrschenden Nervenfiebers*. Ulm, 1800.

¹³ J. Hain, *Handbuch der Statistik des österreichischen Kaiserstaats*. Vienna, 1852. Vol. i, p. 78.

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Bavarian cities that are said to have been attacked.¹⁴ In Augsburg the number of deaths was :

1805	.	.	.	.	.	.	1,189
1806	.	.	.	.	.	.	1,840
1807	.	.	.	.	.	.	1,165

Epidemics also broke out away from the military roads, as in Ingolstadt, Hof, and Nuremberg.¹⁵

In Württemberg, infected prisoners were also transported through Göppingen, Cannstatt, and Vaihingen. In the months of November and December 1806 the number of deaths in the French military hospital at Solitude was rather small, but in January 1807 serious diseases were brought there by Russian and Austrian prisoners.¹⁶ Regarding Pforzheim, a town in Baden with upwards of 5,000 inhabitants, we have more detailed information; ¹⁷ in December and January transports of Russian prisoners arrived there, bringing with them 'putrid fever'. 'Curiosity, pity, a sense of duty, and the distribution of food brought many citizens and servants in contact with them, and they were almost all infected.' Military hospitals were erected inside and outside the city; and it is stated that those who were directly infected by the Russians suffered much more severely than those who contracted the disease later on. Diarrhoea was rare, but on the skin appeared 'red spots of varying size and shape, usually like flea-bites; they developed first on the neck and breast.' The climax of the epidemic was in the last part of January and the first part of February; in May it disappeared. Of 183 patients treated, Roller lost 26 by death. The total number of deaths in Pforzheim due to the pestilence was 130 (civilians), 77 of

¹⁴ Seitz, op. cit., p. 150.

¹⁵ P. G. Joerdens, *Semiotische Bemerkungen über die auch zu Hof im Jahre 1806 herrschend gewesenen Nervenleber. Hufelands Journal der prakt. Heilkunde*. Vol. xxv. 1807. Third section. P. 58.

¹⁶ E. Gurlt, op. cit., p. 151.

¹⁷ J. Ch. Roller, *Geschichte und Beschreibung der Stadt Pforzheim*. Heidelberg, 1816. P. 247 ff.

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them being between the ages of twenty and sixty. The total number of deaths, which in the years 1801-5 had averaged 163, in the year 1806 was 346; in the years 1807-10 the average number of deaths was 196.

Typhus fever also appeared in France in the winter of 1805-6, having been brought there by prisoners of war; Autun, Semur, and Langres were attacked.¹⁸

In Napoleon's war against Prussia (1806-7) typhus fever broke out in the provinces of East Prussia, where the second half of the war was waged. According to Hufeland,¹⁹ the disease appeared wherever the soldiers went in the fall, winter, and following spring; he diagnosed it as putrid fever, nerve fever, and typhus fever. Hufeland, to be sure, often points to the fact that the disease of 1806-7 was in several respects different from that of 1803; in particular, the disease of 1806-7 was characterized by a long period of incubation, lasting diarrhoea, meteorism, blood in the evacuations of the bowels, and a long convalescence. But since Hufeland expressly says that the disease lasted twenty-one days, and at the same time mentions petechiae and the fact that the disease often broke out suddenly, there can be no doubt that it was typhus fever. The peculiar mixed character of his description can be explained only by the assumption that epidemics of typhus fever and typhoid fever appeared simultaneously, and that the two diseases were regarded as one and the same. Gilbert²⁰ expressly mentions 'éruptions pétéchiâles' in his description of these epidemics in the military hospitals. In Königsberg typhus fever raged in the hospitals and among the inhabitants, 6,392 of whom

¹⁸ A. Laveran, op. cit., p. 254.

¹⁹ Hufeland, *Bemerkungen über die Nervenfeber, die im Winter 1806-7 in Preussen herrschten*. Hufelands Journal der prakt. Heilkunde. Vol. xxvi. 1807. Third section. P. 120.

²⁰ N. P. Gilbert, *Tableau historique des maladies internes de mauvais caractère, qui ont affligé la grande armée dans la campagne de Prusse et de Pologne et notamment de celles qui ont été observées dans les hôpitaux militaires et les villes de Thorn, Bromberg, Fordon et Culm dans l'hiver de 1806 à 1807, le printemps et l'été de 1807*. Berlin, 1808.

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died. In Thorn, Bromberg, and Culm, all of which had military lazarets, the disease spread from them to the civil population. In Danzig, which in the spring of 1807 passed through a siege of seventy-six days, the condition of health was good, whereas typhus fever raged among the French besiegers. In 1805-6 the disease was conveyed by Russian troops to Silesia, where it broke out in Trachenberg, Adelnau, Ostrowo, Wohlau, Neisse, and Leobschütz.²¹ German prisoners brought typhus fever with them to France, where it broke out in the first part of January 1807, in the Departments of Aube and Yonne.²²

Typhus fever raged less furiously during Napoleon's war with Austria in 1809. After the battle of Wagram it appeared in the overcrowded hospitals of Vienna, and also in Tyrol. Since the war had first been waged in Bavaria, the disease had also broken out there (in Landshut and Augsburg), but had nowhere become very widespread.

Typhus fever broke out in the form of very severe epidemic during the long struggle of the French in Spain and Portugal in the years 1808-14, since here the French army suffered terribly in consequence of unremitting hardships, the scanty supply of food, and the poor hospital arrangements. While in the Spanish Peninsula the French army is said to have lost 300,000 men in consequence of disease, and 100,000 men in consequence of the enemy's arms. A particularly severe epidemic raged in Saragossa when that city was besieged by the French in the months of June, July, and August 1808, and again in the months of December-February, 1808 and 1809; of 100,000 inhabitants 54,000 succumbed to typhus fever, and of 30,000 soldiers 18,000 fell victims to the same disease, so that the city was forced to capitulate.²³ In the year 1810 yellow fever caused great

²¹ Gurlt, op. cit., p. 177.

²² Ozanam, op. cit., vol. iv, p. 266.

²³ von Linstow, op. cit., vol. xxix, p. 204. Compare also *Der Feldzug von Portugal in den Jahren 1811 und 1812 in historischer und medizinischer*

devastation in the southern part of Spain, attacking Cadiz, Cartagena, and Gibraltar; in 1811 it raged furiously in the provinces of Murcia and Valencia,²⁴ but the epidemic was confined to the coast.

From Spain typhus fever was frequently conveyed by transports of prisoners to France; the border districts through which the prisoners passed were the first to be attacked, as, for instance, the town of Dax (near Bayonne). Ozanam says:²⁵ 'La France en ressentit les effets depuis les Pyrénées jusqu'aux environs de Paris, sur toutes les routes suivies par les prisonniers espagnols, et l'Angleterre en fut infestée au retour des débris de ses troupes du même pays. En France la ville de Dax, frontière de l'Espagne, fut une des premières à éprouver les ravages des maladies épidémiques, qui accompagnent toujours les armées. La situation basse et marécageuse, jointe à l'encombrement de son hôpital par des militaires atteints du typhus nosocomial, ne tarda pas à favoriser la propagation de la contagion, et elle fut bientôt transmise aux environs. Les prisonniers espagnols y contribuèrent encore, et le caractère contagieux de la maladie ne fut pas plus douteux, lorsqu'on vit les employés au service des hôpitaux et à celui du transport de ces militaires en être tous atteints.' (France felt the effects (of the disease) all along the routes followed by the Spanish prisoners—from the Pyrenees to the environs of Paris, while England was infected by the remnants of its troops when they returned from France. The town of Dax, situated near the border between France and Spain, was one of the first places to experience the ravages of the epidemic diseases which always accompanied the armies. Its low, marshy situation, together with the fact that its hospital was overcrowded with soldiers infected with noso-

Hinsicht. Besch. von einem Arzt der französischen Armee von Portugal. Stuttgart und Tübingen, 1816.

²⁴ A. Hirsch, op. cit., vol. i, p. 238.—Kopp, *Jahrbuch der Staatsarzneykunde*. 6. Jahrgang. Frankfurt-on-the-Main, 1813. P. 246.

²⁵ Ozanam, op. cit., vol. iv, p. 269.

comial typhus, greatly favoured the propagation of the contagion, which soon spread throughout the vicinity. The Spanish prisoners also helped to spread it, and the contagious character of the disease was no longer questionable when the attendants at the hospitals, as well as the men who had charge of transporting the sick, were seen to contract it.)

The Spanish prisoners were sent far into the interior, and caused outbreaks of pestilence wherever they went. In consequence of the strain and exertion involved in their transportation, and also of the inferior food, typhus fever soon became very widespread among them. Diseased and wounded men were always carried in the same wagons, while it was often necessary to remain for a considerable length of time in camps, where sick and healthy men lay side by side on straw; thus many died on the way. In order to prevent the disease from spreading to the civil population, it was arranged that the buildings designated for the prisoners should lie away from the town where the soldiers were quartered, or that the prisoners should be sheltered in barracks. All intercourse between the prisoners and the inhabitants was forbidden, and after their departure the straw used by them was burned, and the buildings they had occupied were fumigated.²⁶

Since, however, it finally became necessary to house the sick in hospitals, it was absolutely impossible to prevent the disease from spreading. The result was that the following places in Central France were attacked: Limoges, Guéret, Châteauroux, Issoudun, Moulins, Nevers, La Charité, and Bourges.²⁷ As people everywhere were afraid of contracting the disease, the prisoners were transferred as soon as possible to near-by districts, and this merely helped to spread the disease. According to Boin, Bourges, in the

²⁶ Hufeland, *Journal der prakt. Heilkunde*, vol. xxxvi, 1813, May vol. p. 120.

²⁷ A. Boin, *Mémoire sur la maladie qui régna en 1809 chez les Espagnols prisonniers de guerre à Bourges*. Paris, 1815.

year 1809, became the rendezvous of all Spanish prisoners, who were housed there in barracks and in public hospitals; of 653 prisoners of war received in the public hospitals, 103 died. In the city itself only a few cases of typhus fever were observed. The highly contagious nature of the disease was well known to Boin, who says:

‘ Les dames religieuses de la Charité, chargées du service des salles, les élèves en chirurgie, les servans, les gardes de nuit, le casernier, les gendarmes qui escortaient les voitures remplies de prisonniers malades, le chapelain, le secrétaire du commissaire des guerres, les personnes que la charité évangélique a fait imprudemment entrer dans les salles, ont été frappés de la maladie. Tous ont couru des risques, quelques-uns ont succombé.’ (The nuns who had charge of the rooms (in the hospital) at La Charité, the medical students, the attendants, the night-watchmen, the porter, the gendarmes who escorted the carriages conveying sick prisoners, the chaplain, the secretary of the War Commissioner, and the persons who imprudently allowed a sense of duty and charity to induce them to enter the rooms—all contracted the disease. They all ran risks, and some of them died.) Nevertheless, Boin did not hold the disease in Bourges to be typhus fever, but a ‘fièvre maligne putride’; he also adds that he failed to observe petechiae in a single instance. The physicians sent by the Government, on the other hand, diagnosed the disease as ‘hospital fever’. Inasmuch as there is no doubt expressed anywhere else regarding the appearance of typhus fever among the Spanish prisoners (Ozanam speaks expressly of the appearance of petechiae on the second, third, or fourth day), it was undoubtedly that disease which broke out in Bourges.

Not only the French, but also the English troops were attacked by typhus fever in Spain and Portugal; they are said to have lost 24,930 men in consequence of diseases, and 8,889 men in consequence of battles and skirmishes. The disease was conveyed to England by returning soldiers, but

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was confined there to a few houses. After the battles of the year 1808, which went against the English, the badly infected English troops were transported on ships in stormy weather to Plymouth, where from January 24, 1808, to January 24, 1809, some 2,427 of them were received into the hospitals. Of that number 824 were suffering from typhus fever, and 1,503 from dysentery; all told, 405 died.²⁸

²⁸ Ozanam, *op. cit.*, vol. iv, p. 275.

CHAPTER VI

THE EPIDEMICS OF TYPHUS FEVER IN CENTRAL EUROPE FOLLOWING UPON THE RUSSIAN CAMPAIGN AND DURING THE WARS OF LIBERATION (1812-14)

1. GENERAL OBSERVATIONS REGARDING TYPHUS FEVER

TYPHUS fever, as a specific disease, was well known to the military physicians during the age of Napoleon, since, as set forth in the previous chapter, it regularly appeared during the numerous Napoleonic wars in the form of widespread epidemics. In France the simple word 'typhus' was often used to denote the disease, and the custom still prevails there. In Germany the disease was called infectious nerve fever, war plague, lazaret fever, &c.

At the beginning of the nineteenth century it was generally believed that great hardships, colds, lack of the necessities of life, and the consequent consumption of spoiled foodstuffs give rise to fevers, and that these fevers, in accordance with the epidemic character of the year and of the season, and also in accordance with the severity of the hardships undergone, might develop into dysentery and typhus fever. At all events, even the eminent physicians of the day, men like Hildenbrand of Vienna¹ and Hufeland of Berlin, who in the course of two decades had abundant opportunity to study the disease, assumed that it is possible for typhus fever to break out spontaneously. It was believed that this fever, originating spontaneously, gradually developed the power of infection. Hufeland's position was self-contradictory, for he assumes that the disease can break out spontaneously and yet that it can be warded off by means of isolation.² He says: 'A proof of the fact

¹ J. V. von Hildenbrand, *Über den ansteckenden Typhus*. Vienna, 1810.

² C. W. Hufeland, *Über die Kriegspest aller und neuer Zeit, mit besonderer*

that this disease can spread only through infection is offered by the stronghold of Küstrin, which, being closed up tightly during the entire year of 1813, was free from disease, whereas all the surrounding country, even the army of the besiegers, suffered terribly.' Whereupon Hufeland immediately adds: 'The war carried on among us and by us with such unheard-of exertion and hardship caused the disease to break out several times anew throughout our country, and hence it could but become general.' That it is possible for typhus fever to break out spontaneously and subsequently spread by infection was everywhere believed, even by French physicians. It is hardly necessary to say, however, that the theory of the spontaneous origination of the disease does not accord with modern views. The severe hardships undergone, the hunger and cold, the effluvium of gangrenous wounds, the moral depression, and the many other bad effects which characterized this war more than any other, necessarily decreased the soldiers' power of resistance and increased their susceptibility to infection. Incidentally, all sorts of telluric and meteorological phenomena, volcanic eruptions, earthquakes, the great heat and dryness of the year 1811, the meteors of that year—all these things were at the time brought into causal connexion with the war pestilences of the years 1813-14.

'Many people stated positively', says Hufeland,² 'that they contracted the disease almost immediately after they had occupied small, narrow rooms in company with infected French soldiers, or after they had washed their clothes or waited upon them. This frequently happened in small houses that undertook, for a small profit, to shelter invalid

Rücksicht auf das Aderlassen in derselben. Hufelands Journal der praktischen Heilkunde, vol. xxxviii, 1814, June vol., p. 55. See also special copy with the title, Ueber die Kriegspest alter und neuer Zeit, mit besonderer Rücksicht auf die Epidemie des Jahres 1813 in Deutschland. Berlin, 1814.

² Hufeland, *Erster Bericht über das epidemische und ansteckende Nervenfeber und dessen Behandlung im kgl. Charité-Krankenhaus zu Berlin. Hufelands Journal, vol. xxxvi, 1813, June vol., p. 8.*

soldiers quartered upon the wealthier citizens. Many asserted that they contracted the disease by passing the night in small inns in the towns and villages around Berlin, and on the roads from Königsberg, Danzig, and Frankfurt, and by sleeping on beds or straw which had shortly before been used by infected Frenchmen or Russians. A certain number of men contracted typhus fever by serving as attendants, in order to earn a little money, in the local French military hospital. In this way many of the servants and attendants employed there, as well as numerous surgeons and apothecaries, contracted the disease and subsequently infected the members of their families who brought them home and took care of them, and who, in turn, infected the other inhabitants of the house and of the neighbouring houses.' Further on, Hufeland adds that only those inmates of the hospital contracted the disease who, as servants and attendants, had been in close and constant contact with the patients.

In the years 1813-14 a large number of physicians were carried away by typhus fever; it was estimated at that time that some 500 of them throughout Germany (excluding the surgeons) fell victims to the disease—in Silesia alone 63 physicians died, in Leipzig 17, in Württemberg 17, and in Baden 35.⁴

Emphasis was always laid upon the fact that the clothes and other effects of people who had succumbed to typhus fever were highly infectious. The wide prevalence of the disease among the Jewish inhabitants of Vilna was attributed to ignorance or disregard of this fact; for when orders were issued to destroy such clothing, the Jews, out of sheer avarice, disobeyed them. The persons who acquired such effects in this cheap and illicit manner usually paid the penalty themselves; in addition, they did a great deal toward spreading the disease.

The military hospitals were also largely responsible for

⁴ J. H. Kopp, *Jahrbuch der Staatsarzneykunde*. 1814. Vol. vii, p. 280.

the dissemination of typhus fever; Parenteau-Desgranges⁵ called them outright 'centres de contagion'. The cities in which military hospitals were erected were always severely attacked by the disease. It was generally complained, even by the French physicians, that the French hospitals were poorly arranged and badly managed—even simple cleanliness and competent attendants were lacking. Patients suffering from infectious disease were placed together with others suffering from some mild form of sickness or from a wound, thus giving the infection the best conceivable chance to spread. Let us read how a French physician describes the conditions in Verdun during the severe epidemic of typhus fever that raged there in the years 1792-5:⁶

'The disease spread with no less severity from other sources of infection, such as the temporary hospitals established in the Convent of Canons of Saint Nicholas, in the Monastery of Saint Vannes, and in the barracks. The unfortunate patients, thrown in heaps on the damp stone and earth floors, scarcely having under them a few mats, or perhaps some dirty straw, filthy with their excrement, three of them often sharing a single blanket of coarse wool, presented the most dismal picture one could possibly imagine. At least three-quarters of the patients died. They were buried in huge ditches dug in the vicinity of the ramparts, and in the gardens surrounding the abbeys of Saint Vannes and of Saint Nicholas.'

The German Central Hospital Management, which was founded in the latter part of November 1813, and from which Bavaria and Württemberg held aloof, sought to introduce certain improvements into the military lazaret system, but it was unable to accomplish a great deal, owing to the

⁵ J. Parenteau-Desgranges, *Hommage à la vérité; précis historique des événements les plus remarquables survenus depuis la rentrée de la Russie jusqu'au passage du Rhin*. Paris, 1814.—*Journ. de méd., chir., pharm., etc.*, 1814, Vol. xxix, p. 407.

⁶ Maréchal et Didion, *op. cit.*, p. 287 ff.

lack of hospitals, physicians, and all the means necessary for the treatment of sick and injured people.

Very dangerous for the dissemination of the disease was the belief that the placing of typhus fever patients together with other invalids did no harm, but rather that the congregating of numerous typhus fever patients by themselves caused the contagion to develop with especial severity. The Saxon staff surgeon Neumann, for example, writes in regard to this question: 'Anybody who lies in a bed to which the poison is still clinging will without fail contract the disease; on the other hand, I have often seen people suffering from other forms of sickness lie alongside of typhus-fever patients and escape infection, provided they had nothing in common, did not touch one another, or make use of one another's linen. Hence I draw the conclusion that the poison of typhus fever, like the poison of bubonic plague and small-pox, cannot enter the system from a distance, not even from a very short distance, and can be communicated only by close and direct contact. This seems to contradict our experience that the intensity of the poison is greatly increased when several patients lie side by side. Accordingly, I warn all military physicians not to congregate all their typhus fever patients in a single room by themselves; for few would come forth from such a room alive, while the poisoned atmosphere of the room would pervade the entire lazaret, infect the physicians and attendants, and finally spread throughout the immediate neighbourhood. People think that they can prevent the disease from spreading by congregating and isolating the patients, but as a matter of fact this has the opposite effect. This is clear when we consider that the mere being together of unhealthy people causes the poison to develop, and that not only the people themselves, but also the very exhalations from their bodies, are sufficient to spread the infection. For example,

⁷ Neumann, *Ein Wort über die Fieber, die in Lagern und Militärlazaretten auszubrechen pflegen*. *Hufelands Journal*, vol. xxxiv, 1812, April vol., p. 70.

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if a considerable quantity of dirty clothes or linen is allowed to accumulate in a pile, and after a short time is picked up, the usual result is that the people who do the work experience a severe attack of typhus fever.'

Very often conditions made segregation impossible, even when it was desired, or else the French generals refused to permit it. Consequently, infection was so frequent in the hospitals that the disease at a very early date acquired the name 'hôpital fever' (*fièvre d'hôpital*).

The fact that the weather conditions exerted some influence was not to be overlooked; in the year 1813, when the warm weather began, the disease abated a little, whereas in the year 1814 it ceased altogether at the beginning of the warm weather. The reason for this was that the cold weather forced people to huddle together in houses, and that bathing and washing, particularly among the soldiers and poor people, was less frequently and profusely indulged in; another reason was that the heavier clothing worn in winter facilitated the breeding of vermin.

Failure to take measures of precaution, if the disease once broke out in a neighbouring place, also contributed greatly toward the dissemination of it. 'If typhus fever was present in any military halting-place, frequently nothing was done to prevent it from infecting the next place, where it had not yet made its appearance; or, if anything was done, it was often merely to issue an order which was not complied with.'⁸ At the same time, to be sure, one must take into account the fact that sheer ignorance rendered useful measures impossible. If this ignorance prevailed in the highest places, nothing better was to be expected of the small cities and towns.

That the 'contagious typhus' prevalent during the Napoleonic wars was the same disease which we call typhus fever is very certain. The physicians of the middle of the nineteenth century, when views of typhus and typhoid fever

⁸ Kopp, *op. cit.*, vol. vii, p. 202.

had cleared up somewhat, have confirmed this fact.⁹ The descriptions of the disease are almost invariably reproductions of the same picture, the sole difference being that it was much more severe and fatal among the half-starved soldiers on their return from Russia, and among soldiers packed together in strongholds, than it was among people who were less afflicted by the war and who lived at a distance from the military routes.

As a rule, the disease broke out eight or nine days after infection. It began with a general indisposition, which lasted several days, or, if this indisposition failed to appear, with a chill, great languor, loss of appetite, and weakness in the limbs; frequently brain disorders also manifested themselves, at first in the form of a mild stupefaction, singing in the ears, violent headache, somnolence, or wild delirium. The exanthema usually appeared between the fourth and the seventh day. Hufeland describes it as 'an outbreak of red spots, covering most of the body; they were mostly of a violet tinge, but were not sharply defined, and often gradually merged into the colour of the rest of the skin'. It was frequently asserted that the petechiae now and then failed to appear at all, even in severe cases. Jörg says expressly:¹⁰ 'Sometimes they broke out sparsely, one here and one there, and in such cases it was easy to overlook them.' After the disease had progressed for two or three weeks the patient's temperature went down, and there were few fatalities after the twenty-first day. Convalescence was of short duration, provided the outbreak had not been preceded by exhaustion due to hardships. In regard to abdominal and intestinal symptoms, great dissimilarity was observed; Hufeland states that when there were no complications, an autopsy revealed not the slightest change in

⁹ C. Cannstatt, *Handbuch der medizinischen Klinik*, vol. ii, p. 578 ff. 1847.
—Ch. Murchison, *Die typhoiden Krankheiten*. Translated by W. Zülzer.
P. 84. Brunswick, 1867.

¹⁰ J. Ch. G. Jörg, *Das Nervenfieber im Jahre 1813 und eine zweckmässige Behandlung desselben*. Leipzig and Berlin, 1814. P. 27.

the intestinal organs, and Horn says that 'the colour of the intestines was often almost natural.' The severity of the disease varied greatly; it was particularly fatal among the soldiers homeward-bound from Russia, more than half of whom died. It is frequently asserted that the majority of those who were thus directly infected succumbed to the disease, and that it carried away some ten per cent. of the civil inhabitants who contracted it.

Of course it would be a mistake to say that all the epidemics of that time were epidemics of typhus fever; undoubtedly typhoid fever carried away large numbers of people, since it is to be assumed that the disease was endemic in many cities. But owing to the inaccuracy of the descriptions and the lack of autopsies, it is usually impossible to distinguish the diseases with certainty. Even when the results of autopsies were made known, the condition of the intestines was often described so inaccurately that we cannot even make out whether or not there were intestinal ulcers, which are the most important pathological-anatomical symptoms of typhoid fever. But the initial chill, the short duration of the disease (three weeks), the presence of petechiae, the rapid fall of temperature, and the shorter convalescence, all of which are ever-recurring symptoms, enable us to distinguish the epidemic of the years 1812-14 with certainty from typhoid fever.

Through the influence of the works of Hildenbrand and Hufeland the larger part of the medical world of that time came to look upon contagious typhus as a specific disease; other views, however, were vigorously supported, for example, by Markus of Bamberg, who held it to be an inflammation of the brain. The difference of opinion regarding the character of the disease was important, not only theoretically, but also practically, in view of the therapeutic practice of the time; for those who regarded the disease as an inflammation of the brain had naturally, in accordance with the methods then in vogue, to resort to bleeding. But all unprejudiced

observers came to the conclusion that bleeding was harmful, and that it killed all the patients upon whom it was frequently practised. Very soon the beneficial influence of fresh air and cold came to be recognized, and the latter was often provided by means of cold-water baths and douches. 'It was a universally confirmed principle, derived from experience, that the warmer the patients were kept, the more severe was the disease, and the colder they were kept, the milder the disease.' How beneficial fresh air was for the patients was shown by the fact that those who were kept out in the open air withstood the disease much more easily than those who were kept shut up in houses and hospitals, and that it was much less dangerous to transport patients from place to place in the open air, than to keep them shut up in overcrowded hospitals. 'Thousands of patients', says H. Häser,¹¹ 'survived even the most severe forms of the disease without human help of any kind. Many, especially physicians, attributed their recovery to the fact that for weeks at a time they were constantly being transported in the cold winter from one halting-place to another, and were not compelled to lie in overcrowded hospitals, where typhus fever and dysentery raged most terribly.'

In dealing with the epidemic of typhus fever of the years 1812-14 we have a double epidemic to consider. The one was disseminated directly by the returning remnants of the 'Grand Army', and after causing terrible devastation in East Prussia it spread, in a relatively milder form, to other parts of Germany. The other epidemic broke out during the great battles in Saxony, which lasted several months, and from there spread virulently over a large part of Germany. In order to avoid repetition, the following account will treat of the dissemination of the two epidemics jointly.

¹¹ H. Häser, *op. cit.*, vol. iii, p. 613.

2. THE RUSSIAN CAMPAIGN AND TYPHUS FEVER IN RUSSIA ¹²

Napoleon began to make preparations for his Russian campaign as early as the year 1811; troops were assembled in Westphalia, Hamburg, Saxony, Holland, on the Rhine, and near Verona, and several hospitals were founded, as in Danzig. An army of 550,000 men was organized to take part in the expedition into Russia; it consisted of Frenchmen, Germans, Italians, Spaniards, and Poles. How this army was destroyed on its march to and from Moscow, and in what a pitiable condition the remnants of it arrived in Germany, is well known. Since it is our purpose to point out here how that severe epidemic of typhus fever spread abroad from those remnants, we can deal but briefly with the prevalence of the disease in the army itself.

In consequence of the great heat, of the lack of drinking-water and good food, and of the continual bivouacking (the peasants burned and deserted all the villages along the way),

¹² J. R. L. Kerckhoffs, *Observations médicales faites pendant les campagnes de Russie en 1812 et d'Allemagne en 1813*. First edition, 1814. Third edition, 1886. Reproduced in epitome by W. Stricker in his *Historische Studien über Heereskrankheiten und Militärkrankenpflege*, 1748-1814. Virchow's *Archiv für pathologische Anatomie u.s.w.*, vol. liii, p. 383. 1871. (The spelling 'Kerkhove' is incorrect.)—J. D. Larrey, *Mémoires de chirurgie militaire*, vols. i-iv. Paris, 1812-17. (Kerckhoffs and Larrey give only indefinite information regarding the nature of the diseases; Larrey, in particular, who served as a surgeon and general inspector on the Health Staff, had very little understanding for the infectious character of typhus fever or for the energetic measures that have to be adopted to prevent its dissemination.)—M. J. Lemazurier, *De la campagne de Russie in Recueil de mémoires de médecine, chirurgie, et pharmacie militaires*, vol. iii, p. 161. Paris, 1817. Translated from the French by C. F. Heusinger, *Medizinische Geschichte des Russischen Feldzugs von 1812*. Jena, 1823. (This book, owing to the clarity of its descriptions, constitutes the best source of information regarding the diseases that broke out during the Russian campaign.)—Ch. J. Scheerer, *Historia morborum, qui in expeditione contra Russiam anno 1812 facta legiones Württembergicas invaserunt; praesertim eorum qui frigore orti sunt*. Tubingae, 1819.—R. Virchow, *Kriegstypus und Ruhr*. Virch. Archiv, vol. lii, p. 1. 1871.—E. Gurlt loc. cit.—W. Ebstein, *Die Krankheiten im Feldzug gegen Russland*. Stuttgart, 1902.

the army suffered greatly even on the march to Moscow. After crossing the Polish border the soldiers were severely attacked by dysentery and diarrhoea; Kerckhoffs estimates that no less than 80,000 men were suffering from dysentery at the beginning of August 1812. Typhus fever broke out, very sparsely, to be sure, as early as the latter part of July, when the army arrived at Vilna; there were also cases in the hospitals at Minsk, Vilkomir, Globokie, and Mittau, but the disease was not yet so infectious as it proved to be later. After the battle of Smolensk (August 14-18) large numbers of wounded soldiers (between 6,000 and 10,000 according to various reports) were brought to that city, and from that time on, typhus fever and other diseases (hospital fever, diarrhoea, dysentery, gastric fever, &c.) continued to spread throughout the army. On September 14, Moscow was entered, and on September 15 the city was in flames. The army then had peace until October 19, when the return march began. During their sojourn in Moscow the soldiers were very improperly nourished, eating almost nothing but salted meat and fish, and drinking large quantities of wine and spirits. According to Lemazurier, the number of sick and wounded soldiers in Moscow was 15,000. The most common disease even in Moscow was typhus fever; according to Scheerer, when Napoleon's army withdrew from the city it left behind several thousand typhus-fever patients, almost all of whom died—only the stronger patients were taken along on wagons.

The horrors of the return march are well known. Thousands froze to death in the extreme cold of November, horse-meat and melted snow were the sole means of nourishment, and any soldier who lay down was irretrievably lost. Between Moscow and Smolensk, which was reached on November 9, one-half of the soldiers who had started out from Moscow died; the number of sick soldiers was enormous, and typhus fever raged more and more extensively. On December 8 Vilna was reached, but there the army was not given

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a moment's rest; two days later the Russians advanced and captured 30,000 of Napoleon's soldiers who could go no further.

In pursuing the French army the Russians also suffered severely from diseases; according to Ebstein,¹³ between October 20 and December 14, 1812, they lost 61,964 men, most of whom died of 'nerve fever' (typhus fever).

In Vilna, which was greatly overcrowded, typhus fever raged furiously. The large number of sick and exhausted soldiers that were left behind, owing to the extreme cold (the thermometer went down as low as - 28° Réaumur) sought shelter, partly in private houses, and partly in hospitals. The latter, for the first few days after the arrival of the Russians, were in a terrible condition; sick men and dead men were packed together in the cold, unheated rooms, the former lying on rotten straw, completely deserted, and without care or nourishment. The corridors and courts were filled with dead bodies and with refuse of all kinds, while in the rooms themselves there was no less filth, since nobody removed the excrements. 'The courts and corridors of the hospitals', says Gasc, an eye-witness,¹⁴ 'were so covered with dead bodies that it was necessary to walk over heaps of them in order to enter the rooms.'

Not until after the Emperor of Russia arrived in Vilna was some semblance of order restored. But it was then too late; almost all the patients in the hospitals were infected with typhus fever, and according to Gasc and Lemazurier the great majority of the 30,000 French prisoners died. For owing to the long series of extreme hardships which the soldiers had undergone, the disease broke out in its most severe form, causing wild delirium, very large

¹³ W. Ebstein, *op. cit.*, p. 65.

¹⁴ J. Ch. Gasc, *Histoire de l'épidémie observée à Wilna en 1813 après la campagne de Moscou*. Reproduced in Gasc and Breslau, *Matériaux pour servir à une doctrine générale sur les épidémies et les contagions*, par F. Schnurrer. Translated from the German. Paris, 1815.

petechiae, abscesses, and gangrene. Many patients succumbed within twenty-four hours, and recovery was very slow for those who survived the attack.

In a short time the disease spread throughout the city, not so much because the soldiers were quartered in private houses, as because the Jews got possession of the clothes of the dead. Of some 30,000 Jewish inhabitants no less than 8,000 died. In February and March all classes of society, even the wealthiest people, were attacked. The disease also spread to the surrounding country; Lemazurier says that between the middle of 1812 and the beginning of 1813 some 55,000 bodies were buried in Vilna and vicinity, and that the estimates made in Wittepsk, Smolensk, and Moscow were in proportion. The pestilence spread southward and eastward, and according to Faure, in February 1813 thousands of French prisoners died in the overcrowded hospitals in Orel. The same writer says that all of the French soldiers who fell into the hands of the Russians succumbed to typhus fever.¹⁵ We may safely assume that the civil inhabitants of all places in that part of the country were also attacked, even though we have no figures or statistics to confirm the assumption.

The pestilence also raged extensively in the region of the Baltic Sea; St. Petersburg was severely attacked by it. According to Parrot,¹⁶ in the last months of the year 1812 there were a great many cases of 'nerve fever' in Dorpat; in Riga the military hospitals were overcrowded, and out of a population of 36,000 and a garrison of 20,000 there were 5,000 sick. The mortality in the hospitals was very high, since, on account of the extreme cold, two-thirds of the small windows were covered with boards and hay.

Regarding conditions in Warsaw we have more detailed

¹⁵ A. Laveran, op. cit., p. 254.

¹⁶ Parrot, *Über das im jetzigen Krieg entstandene typhöse Fieber und ein sehr einfaches Heilmittel desselben*. *Hufeland's Journal*, vol. xxxvi, 1813, May vol., p. 3.

information. According to Wolf,¹⁷ two distinct epidemics raged there after the end of December 1812; the one was an epidemic of typhus fever (probably typhoid) and appeared only among the soldiers; the other was an epidemic of typhus fever, which did not attain to epidemic dimensions until January 1813, although a few isolated cases had been observed in Warsaw in the last months of the year 1812. 'This disease was almost invariably accompanied by a spotted exanthema, which, if the disease was at first rather difficult to diagnose, often gave the first clue. In the case of many people the eruption was so severe and so general, appearing even on the face, that it resembled measles.' The comparison with measles was also drawn by other observers. Typhus fever was conveyed to Warsaw by the Austrian auxiliary corps, and it quickly spread to the French hospitals, which were in a wretched condition. Later the Russian army also brought typhus fever to the city. A great many civilians in Warsaw contracted the disease; according to Wolf, the epidemic reached its climax in February, and lasted until the end of the year 1813. The lower classes suffered more than the upper classes from the disease, which, moreover, seems to have raged much more furiously in the vicinity of Warsaw than in the city itself.

3. THE APPEARANCE OF TYPHUS FEVER IN NORTH AND CENTRAL GERMANY

On the return march from Moscow to Vilna the remnants of the army had all taken the same route; for, though all bonds of discipline were loosened as far back as Smolensk, nevertheless the instinct of self-preservation kept all the soldiers from abandoning the common line of march. This was also the case during the march from Vilna to the Niemen,

¹⁷ Wolf, *Bemerkungen über die Krankheiten, welche im Jahre 1813 in Warschau herrschten, insbesondere über den ansteckenden Typhus*. *Hufeland's Journal*, vol. xxxix, 1818, May vol., p. 3.

where the extreme cold caused untold suffering. After crossing the river, however, the few unfortunate soldiers who had survived the awful misery of the march, hungry, clothed in rags, with torn shoes, alive with vermin, with frozen and gangrenous limbs, scattered in all directions, some going home, and others to strongholds that were in the hands of the French. Thus typhus fever, with which all parts of the army were infected, was spread in a comparatively short time over a large part of Germany.

At first the eastern provinces of Prussia, through which these remnants of the army passed, were attacked by the pestilence; owing to the fact that so many were infected, measures of precaution were everywhere futile. 'Adynamic fever', says Kerckhoffs,¹⁸ 'spread also among the civilians, who were not only afflicted by the terrible scourge of our passing armies, but also became the victims of a murderous contagion. It was a fatal present which we gave them, and which caused such a high mortality among the inhabitants of the country through which we passed. Wherever we went, the inhabitants were filled with terror and refused to quarter the soldiers.' In the more distant parts of Germany, in the western provinces of Prussia, in Bavaria, Baden, and Württemberg, where people had perceived the danger, it was easier, in the first months of 1813, to guard against the dissemination of typhus fever, since the number of returning soldiers was small and it was accordingly feasible to enforce orders regarding quarantine. With the approach of spring the disease began to abate a little even in the north and east; in the month of April it had almost entirely disappeared from the French troops there, while in May and June the condition of health among them, according to Kerckhoffs, was very good. But in July typhus fever broke out again, and since the Russian army was also infected with it, the disease became uncommonly widespread throughout Saxony

¹⁸ Kerckhoffs, *op. cit.* Kerckhoffs uses the name '*fièvre adynamique*' for typhus fever; occasionally he uses the word typhus.

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and Silesia during the months of fighting that ensued. After the battle of Leipzig, when southern and western Germany were overrun by French fugitives and prisoners, typhus fever once more broke out in that part of the country with greater severity than ever before; even in the province of Brandenburg and in the adjacent regions the pestilence raged, having been borne thither by French prisoners.

In Lithuania, and East and West Prussia, typhus fever raged extensively in the winter of 1812-13. According to H. A. Göden,¹⁹ who had charge of a large military lazaret in Gumbinnen, the epidemic spread continuously from the border of Russia to Berlin. 'It appeared most virulently', he says, 'in the cities of Gumbinnen, Insterburg, Tilsit, Königsberg, Elbing, Marienwerder, Konitz, and Landsberg; it followed along the military roads, and broke out most severely in the halting-places and in those cities where French military lazarets were established.' In Gumbinnen typhus fever broke out suddenly in the latter part of November, immediately after the arrival of the fugitives, and spread rapidly. At first it appeared in houses where officers and soldiers were quartered; as a rule, several members of a family contracted the disease simultaneously, and only rarely was one member spared. The pestilence raged most furiously in the months of January and February; the town had some 6,000 inhabitants, and frequently 20, 30, or 40 people, including entire families, died in a single day. In the military lazarets the mortality was considerably higher. In March the pestilence began to abate, and in May it disappeared altogether.

In Königsberg the pestilence began in the month of December 1812 and came to an end in May 1813; excluding the soldiers who died in the military lazarets, the following deaths were recorded there:

¹⁹ H. A. Göden, *Erfahrungen und Ansichten zur Lehre vom Typhus*. Horn's *Archiv für mediz. Erfahrung*, 1814, p. 342.

122 EPIDEMICS RESULTING FROM WARS

December (1812)	430
January (1813)	581
February	802
March	622
April	608
May	327
June	196
July	178
August	157
September	160
October	151

In the year 1812 there were 2,648 deaths in Königsberg, whereas in the following year there were 4,403. In the first part of January, when the city was evacuated by the French, 10,000 people, according to Stricker, were left behind. The entire province of East Prussia, according to Gurlt, lost 20,000 inhabitants by typhus fever.²⁰

Danzig, which was besieged by the Russians from January 11 to November 29, 1813, suffered terribly. A French army of 35,900 men, under General Rapp, was in the city, and during the siege it was exposed to all sorts of privations as well as to extreme cold. As early as February typhus fever had become very widespread; from January to May, 11,400 soldiers died in the hospitals (4,000 in March alone), while 5,592 inhabitants succumbed to the disease in the course of the entire year.²¹

Silesia was hit extremely hard. The pestilence was conveyed there in the months of October, November, and December 1812 by transports of Russian prisoners, and it appeared in Trebnitz, Striegau, Krottkau, Friedenwalde, Trachenberg, Breslau, Parchwitz, Quaritz, &c. The officers on duty, the persons who lifted the patients from the wagons, the physicians, and the sick-attendants were always the first to be infected.²² With the opening of spring the disease disappeared, but broke out anew after the battle on the

²⁰ Gurlt, op. cit., p. 217.

²¹ A. F. Blech, *Geschichte der siebenjährigen Leiden Danzigs von 1807-14*. Danzig, 1815.—Carl Frickius, *Geschichte der Befestigungen und Belagerungen Danzigs*. Berlin, 1854.—H. Beitzke, *Geschichte der deutschen Freiheitskriege in den Jahren 1813-14*. Second edition. Berlin, 1859. Vol. ii, p. 604.

²² Kopp, op. cit., vol. vii, p. 284. 1814.

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Katzbach. In Breslau the disease appeared in a very virulent form, since the infected soldiers were housed there in overcrowded lazarets, which in the month of November took in some 6,300 patients daily; numerous physicians (statements vary between 16 and 22) also succumbed to typhus fever. Among the civil inhabitants, to be sure, the disease did not become very widespread; out of a population of 62,789, only 3,055 died in the year 1812, 3,095 in the year 1813, and 3,301 in the year 1814. From the middle of September 1813 to February 1814, 478 civilians and some 1,800 soldiers succumbed in Breslau to typhus fever; the total number of soldiers that died between the middle of September and the beginning of March was 3,400.²³ In the governmental district of Liegnitz, having a population of 600,000, according to Kausch²⁴ only 13 physicians (excluding the surgeons) died. The disease was borne by transports of infected soldiers into other parts of Silesia, and at the end of the year 1813 all the military lazarets in Silesia were infected. In Waldenburg and vicinity (Obersalzbrunn, &c.) typhus fever broke out after the soldiers had marched through on October 20 and November 25, 1813, and seventeen days later the disease was very widespread, all the members of many families having contracted it. In Bunzlau typhus fever raged with unusual fury; in the military lazaret 12,000 men are said to have died between June 1813 and March 1814.

Presently typhus fever appeared, with the arrival of the remnants of the Grand Army, in regions further away from the Russian border. Häser²⁵ describes the manner in which the disease spread, always along military roads, as follows:

'French soldiers returning from Russia', he says, 'spread

²³ Wendt, *Über die letzte Typhusepidemie insofern sie den Nichtarzt interessiert*. *Corr.-Blatt der schles. Ges. für vaterländische Kultur*, vol. v, 1814, Nos. 17 and 18.

²⁴ Kausch, *Die auf Selbsterfahrung gegründeten Ansichten der akuten Kontagien überhaupt und des Kontagiums des Typhus insbesondere*. *Hufeland's Journal*, vol. xxxix, 1814, July vol., p. 9.

²⁵ Häser, *op. cit.*, vol. iii, p. 612.

the contagion of various diseases over a large part of Central Europe. Almost naked, or clothed in torn and half-burned rags, without shoes, their feet covered with straw, and their frozen limbs covered with festering sores, they marched through Poland and Germany. Typhus fever and other diseases associated with it marked their course. The inhabitants of the country were forced to house the sick; but teamsters also conveyed the infection to villages which the soldiers did not visit. The disease raged most furiously in the hospitals, which scarcely anywhere were able to meet even the most modest demands made upon them.'

Regarding the appearance of typhus fever in Berlin we are informed by Hufeland and Horn.²⁶ First to occur there (in the months of February and March 1813) were numerous cases of 'nervous fever', which was doubtless typhoid fever. Still it is likely that cases of typhus fever also occurred at that time, for Horn, in writing about 'nervous fevers' in the Charité, describes the exanthema with the same words that Hufeland uses in reference to later cases. Among these patients there were already some who had returned from Russia.²⁷ At all events, in the first part of March 1813 there occurred cases of contagious typhus, which was brought to Berlin by French, and later by Russian soldiers; the observed ways of infection, regarding which Hufeland informs us, are mentioned above. In the middle of April there were 246 typhus-fever patients in the Charité. In order to prevent the disease from spreading in this hospital, Hufeland adopted strict measures of precaution. The patients were all carefully isolated on the second floor, which was shut off by means of a grating. The newly-arrived patients were supplied with clean, fresh linen, their clothing was disinfected for several days in hydrochloric acid, and then washed in boiling water containing lye,

²⁶ Hufeland, op. cit.—E. Horn, *Über die ansteckenden Nervenfeber, welche während der Monate März, April, Mai, Juni, u.s.w. 1813 herrschten. Archiv für mediz. Erfahrung.* Jahrgang 1813, p. 278.

²⁷ Horn's *Archiv für mediz. Erfahrung.* Jahrgang 1813, p. 245.

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while objects of no value were burned. The sick-rooms were constantly ventilated by leaving the windows open, and were thoroughly cleaned every day. The physicians, surgeons, and attendants, before they entered the sick-rooms, had to put on black mantles of glazed linen, and on leaving the rooms they had to wash their hands and faces in cold water and rinse out their mouths. In this way the disease was prevented from spreading in the hospital itself.

After the battle of Leipzig typhus fever broke out anew in Berlin; according to Horn, 144 cases of 'nerve fever' were received into the Charité in January 1814, 92 in February, 54 in March, 14 in April, 8 in May, and none in June. Regarding the total mortality in the epidemic of typhus fever in Berlin, which in the year 1813 had about 155,000 inhabitants, the following table, compiled by Gurlt,²⁸ gives us information; there died in:

	1812.		1813.		1814.
	Total		From	Total	From
	deaths.	deaths.	Typhus.	deaths.	Typhus.
January	422	500	31	680	170
February	457	544	57	596	118
March	444	740	233	781	85
April	476	719	227	653	55
May	584	752	184	443	28
June	396	518	85	434	19
July	417	460	29	541	14
August	338	551	20	454	5
September	370	667	22	577	16
October	425	621	34	430	13
November	356	555	105	412	11
December	571	585	157	565	11
Total	5,256	7,012	1,184	6,566	545

Typhus fever appeared throughout the entire province of Brandenburg. Maier²⁹ gives us some information regarding the city of Brandenburg, where 'infectious nerve-fever' disappeared in the latter part of May 1813, and where, after the battle of Leipzig, it again broke out, but did not become very widespread. On October 27 prisoners from

²⁸ Gurlt, op. cit., p. 339.

²⁹ Horn's *Archiv für mediz. Erfahrung*. Jahrgang 1813, p. 431.

Baden and Hesse were quartered there; they remained until October 31 and then went on to Ruppín. Among them were some convalescents from a military lazaret in Saxony, who infected the occupants of all the houses in which the prisoners were quartered. Between November 5 and December 6 there were 38 'nerve-fever' patients in the Altstadt and 7 in the Neustadt, a small number of whom died. Typhus fever raged very furiously in Jüterbog after the battle of Dennewitz, carrying away entire families.

After his defeat in Russia, Napoleon had quickly returned to France, and there, by means of new conscriptions, had in a short time assembled an army of very young men, who had never done military service and were therefore not accustomed to the hardships of war and, in particular, were much more susceptible to infectious diseases than the troops that had served under him before. In April, when the army of the Allies had arrived at the Elbe, Napoleon with his newly-gathered army left the Rhine and marched to Saxony, which from then until autumn was the main scene of the war. Since the Russian army was still infected with typhus fever, contracted in the winter campaign, and since, furthermore, isolated cases of the disease were still occurring among the remnants of the French troops that had returned from Russia, the inevitable result was that Saxony was not only completely impoverished by the protracted war, but was also terribly afflicted by war pestilences.

In Saxony typhus fever had already become very widespread in the first few months of 1813; all the places through which the military transports passed were attacked, as Sorau, Guben, Lübben, Görlitz, Leipzig, and Weissenberg; while places in which military hospitals were erected fared even worse, as Schneeberg, Zwickau, Chemnitz, Freiberg, and Augustusburg. The severe epidemic in Annaberg (in the Saxon Erzgebirge), lasting from March to May 1813, has been described by Neuhof.³⁰ In March a Saxon field-hospital was

³⁰ Neuhof, *Geschichte und Beschreibung des im Jahre 1813 und 1814 zu*

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established there, and presently everybody who came in contact with the hospital contracted typhus fever. In neighbouring Thum, where the patients passed only one night, many citizens succumbed to the disease.

Dresden, in the first few months of the year 1813, was not attacked by the disease, notwithstanding the fact that soldiers and officers returning from Russia were taken sick and died there; only in rare instances were citizens, in whose homes officers had been quartered, attacked, and the disease did not rage at all extensively.³¹ On the other hand, typhus fever raged furiously in Dresden after Napoleon's successful battle at Bautzen (May 20 and 21, 1813), when large numbers of wounded soldiers were brought to Dresden and placed in lazarets, which soon became greatly overcrowded. The less-severely wounded were housed in the homes of citizens, who were compelled to receive them and suffered terribly in consequence of it. The result was that typhus fever spread from the soldiers to the civilians. After the battle of Dresden (August 26, 27), from which Napoleon again emerged victorious, but especially during the short siege of Dresden (from the middle of October to November 11), the epidemic increased in both extent and fury. The increased mortality is shown by the following table, which includes only the residents:

January	.	.	.	.	.	.	184
February	.	.	.	.	.	.	199
March	.	.	.	.	.	.	188
April	.	.	.	.	.	.	194
May	.	.	.	.	.	.	289
June	.	.	.	.	.	.	257
July	.	.	.	.	.	.	264
August	.	.	.	.	.	.	474
September	.	.	.	.	.	.	882
October	.	.	.	.	.	.	659
November	.	.	.	.	.	.	960
December	.	.	.	.	.	.	944

Annaberg im sächsischen Erzgebirge allgemein geherrschten Nervenfiebers. Annalen der Heilkunst des Jahres 1815, p. 5.

³¹ A. F. Fischer, *Geschichtliche Darstellung der im Herbst 1813 in Dresden*

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According to Fischer, one person out of every ten that contracted the disease died, while the mortality in the French military hospitals was incredibly high. In the course of the year 1813 no less than 21,090 soldiers died in Dresden, while in the same year 5,194 residents died; 3,273 civilians died in the year 1814, and 1,785 in the year 1815. The average number of deaths per annum among the civil inhabitants was 2,304.

Regarding the terrible conditions in Dresden at that time, a pastor informs us in a letter: ³²

It was a gruesome sight to see the wagons full of naked corpses, thrown together in the most horrible positions, drive away from the hospitals and set out for their destination. Many bodies are said to have been cast into the Elbe. The terrible days began about the middle of May, when many house-owners were obliged to quarter as many as two, three, and even four hundred men. Presently persons suffering from wounds, scurvy, and infectious disease began to arrive from Bautzen, some straggling along piteously on foot, others being rolled along in hastily groups on pushcarts. This disease-spreading mass was not housed in the homes of citizens, since the twenty-five hospitals were no longer able to accommodate them. The houses, yards, streets, and public squares were full of dirt and refuse. Dearth of food, resulting from the breakdown of means of supply, added to the general misery. Entire families were wiped out, and many houses are still standing empty (1814). Wagons bearing the dead clattered on all the streets, and there were few inhabitants who did not wear some outward sign of mourning for lost relatives.

Leipzig suffered even greater hardships. The pestilence was conveyed thither by French soldiers in February 1813, and on the 27th of that month there were thirty-eight fever patients in the Jacobsspital. In the summer of 1813, when the war was going on in Saxony, the disease raged there furiously. After the battle of Dresden a large percentage

ausgebrochenen und bis gegen Ende Januars 1814 angedauerten Epidemie. Annalen der Heilkunst des Jahres 1814, p. 82.

³² Reproduced in Kopp's *Jahrbuch der Staatsarzneikunde*. 7. Jahrgang. 1814, p. 286.

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of the wounded were brought to Leipzig, and more than 20,000 sick and wounded soldiers were kept there for several months. As usual, typhus fever broke out in the city in consequence of it, and carried away large numbers of soldiers and citizens. After the battle of Leipzig upwards of 30,000 wounded soldiers, mostly Frenchmen, were housed in the city. 'Virulent nerve-fever,' says Beitzke,³³ 'which had been prevalent in the city for some time, now broke out with tenfold severity, not only in the city itself, but also in the surrounding country, and carried away large numbers of people. The arrival of the cold weather, which helped to check the disease, was under these circumstances a great blessing.' In the year 1813 some 80,000 French soldiers, according to the hospital lists, succumbed to wounds, war-typus, and other diseases, in Leipzig. From February 1813 to January 1814, seventeen young physicians died there of typhus fever. The number of civilians buried in Leipzig in the year 1813 was 3,499, in the year 1814 it was 2,022; the average number of interments in the years 1810-12 was 1,443, and in the years 1815-17 it was 1,187. The number buried (including the still-births, but not the soldiers) was, by months: ³⁴

	1813.	1814.
January	98	450
February	12	276
March	206	244
April	202	152
May	178	159
June	200	120
July	290	85
August	189	107
September	176	118
October	311	111
November	743	96
December	785	104

Most of those carried away were adults; the following

³³ Beitzke, op. cit., vol. ii, pp. 460 and 562.

³⁴ *Ältere Nachrichten über Leipzigs Bevölkerung 1595-1849. Mitteilungen des statistischen Bureaus der Stadt Leipzig, 1872.*

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table indicates the relation between the age of the victims and the mortality :

Years of Age.	1812.	1813.	1814.
1 . . .	356	517	456
1-10 . . .	161	310	305
10-20 . . .	29	174	76
20-30 . . .	91	362	157
30-40 . . .	87	492	173
40-50 . . .	104	559	207
50-60 . . .	126	409	208
60-70 . . .	124	358	234
Over 70 . . .	119	256	155

In reference to the year 1813, in which typhus fever caused the greatest devastation in Leipzig, we see how the mortality among persons between the ages of ten and sixty increased between fourfold and fivefold, while among very young children and very old men, it increased by at most one hundred percent. In the year 1813 more men than women died (1,900 men and 1,599 women), whereas in the following year the reverse was the case (1,009 men and 1,013 women).

Typhus fever spread throughout all Saxony. In Plauen, which was at that time a city of 6,800 inhabitants, the following number of deaths, according to Flinzer,²⁵ were due to typhus fever: 4 in 1812, 32 in 1813, 59 in 1814, and 5 in 1815. These figures do not include the foreign soldiers that died. According to Flinzer, the specific disease before the year 1819 was usually typhus fever. In the year 1814 the total number of deaths in Plauen increased to 440.

Numerous sick, wounded, and captive soldiers were quartered in Zwickau after the battle of Leipzig. There and in the surrounding villages, in consequence of the erection of a hospital, typhus fever had already appeared in September, but in Zwickau itself, thanks to timely measures of precaution, it gained no headway. In the year 1812 only 183

²⁵ F. Flinzer, *Bewegung der Bevölkerung in der Stadt Plauen i. V. während der Jahre 1800-99. Bericht über die Verwaltung und den Stand der Gemeindeangelegenheiten der Kreisstadt Plauen i. V. auf die Jahre 1899 und 1900.*

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civilians died there, 376 in the year 1813, and 260 in the year 1814; 380 soldiers died there in 1813, and 14 in the year 1814.²⁶

The pestilences spread all over the country, even into the most remote corners of the Saxon Erzgebirge; Annaberg and the neighbouring towns of Marienberg, Werpert, and Geyer were again attacked, although less severely, according to Neuhof, than in the spring. In March the disease disappeared entirely.

The Saxon strongholds along the Elbe fared worst of all; regarding the terrible devastation caused by typhus fever in Torgau we shall have something to say in the tenth chapter. Magdeburg and Merseburg were also severely attacked; this is evident from the fact that one-half of the physicians in Magdeburg (nine in number) succumbed, according to Roloff, to hospital fever. In Wittenberg, whither typhus fever was borne in February 1813 by infected French soldiers, and where it had subsequently disappeared, the mortality was very high during the siege, which lasted from October 28, 1813, to January 14, 1814; of 6,000 or 7,000 inhabitants, upwards of 4,000 had left the city before the siege began. In the course of seven months (July 1813 to January 1814) 590 people died there, whereas the average number of deaths had been only 300 per annum. When the city was captured by the Prussians the death-rate increased; no less than 331 persons died between January 14 and April 14, 1814.²⁷

After the battle of Leipzig the defeated army marched back through Weissenfels, Naumburg, Weimar, and Erfurt to the Main. There was now no active effort made to supply food to the army, which still numbered some 100,000 men; the soldiers had to eat whatever they could pick up along

²⁶ M. Magaziner, *Über den ansteckenden Typhus in Zwickau, vom September 1813 bis zum Februar 1814. Annalen der Heilkunst.* 1815. P. 218.

²⁷ Kopp, *Jahrbuch der Staatsarzneykunde*, vol. vii, p. 413.

²⁸ Gurlt, *op. cit.*, p. 459.

the way. 'Extreme misery and exhaustion', says Beitzke,³⁹ 'led to great excesses; the places along the route were made to suffer, and worst of all, the region through which the French army hurried back was generally infected with the germ of typhus fever.' 'The route of the army, clear to Mayence,' says Giraud,⁴⁰ 'was again strewn with corpses and débris.'

In Weissenfels some 3,000 soldiers are said to have died in the hospitals, and also 600 civilians, within a year. In Altenburg, which had suffered from typhus fever in the spring of 1813, 1,650 men and 55 officers died between October 2 and December 1 of that year. In Eisenberg (in Saxe-Altenburg), according to Greiner,⁴¹ a lazaret was established in the fall of 1813, but there were but few cases of typhus fever transmitted to citizens owing to the adoption of all measures of precaution. On the other hand, the disease was conveyed to numerous near-by villages, in which large numbers of sick and convalescent soldiers were quartered. 'The Cossacks did the most toward spreading the disease, for wherever any of them were quartered, one could count with certainty upon an early outbreak of nerve-fever.' In November 1813, a severe epidemic of typhus fever broke out in Gera, and the mortality in four months was seven times as high as usual. In Zeulenroda (south of Gera) the pestilence was not very severe; it was brought there by sick and convalescent soldiers, who were quartered in the houses.⁴² Jena, on the other hand, was very severely attacked: the epidemic began in November 1813, and lasted until March 1814.⁴³ According to Gurlt, the usual number

³⁹ Beitzke, op. cit., vol. II, p. 564.

⁴⁰ P. F. F. J. Giraud, *Campagne de Paris en 1814*. Third Edition. Paris, 1814. P. 32.

⁴¹ Greiner, *Das exanthematische Nervenfeber. Annalen der Heilkunst des Jahres 1814*, p. 602.

⁴² J. G. Stemmler, *Schilderung des vom November 1813 bis Februar 1814 in Zeulenroda herrschenden Nervenfiebers. Annalen der Heilkunst des Jahres 1814*, p. 97.

⁴³ Löbenstein-Löbel, *Über das Wesen und über die Heilung des Nerven-*

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of deaths in normal years in the districts of Weimar and Jena was from 1,750 to 1,850; but in the year 1813 no less than 3,948 people died there, and in 1814 there were 3,363 deaths.

After the battle of Lützen (May 2, 1813) some 8,000 wounded French and Prussian soldiers came to Erfurt, necessitating the immediate erection of lazarets. After the battles in August, when the scene of the war moved closer to Erfurt, the misery in the city was greatly increased, resulting in a rapid dissemination of typhus fever. In the latter part of August, when 9,000 sick and convalescent soldiers arrived in the city, the citizens were obliged to quarter them; the number of soldiers that succumbed to typhus fever was appalling, while as many as 17 civilians often died in a single day; in the week before the battle of Leipzig 504 soldiers died in the hospitals. On October 20-23 the French lazarets were cleaned out as thoroughly as possible. During the siege, which began on October 25 and lasted seventy-three days, the misery was extreme, and typhus fever raged more and more furiously. From November 1 to November 17 some 400 civilians died, while no less than 1,472 soldiers died in the military hospitals; 143 soldiers died on December 9 and 10. The houses of a few citizens were rendered absolutely tenantless. In the year 1813 Erfurt lost 1,585 citizens, as compared with an average of 554 for the years 1811-12; the number of deaths in the year 1814 was 1,121. Typhus fever also raged so furiously among the Prussian besiegers, that the lazarets were soon overcrowded, and it was necessary to house the troops in other places.⁴⁴

In Fulda, which was forced to take in thousands of sick soldiers, typhus fever soon began to spread rapidly, as it also

febers in und um Jena von Michaelis 1813 bis Ostern 1814. Annalen der Heilkunst des Jahres 1814, p. 217.

⁴⁴ Wilhelm Horn, *Zur Charakterisierung der Stadt Erfurt*. Erfurt, 1848. P. 318 ff.

did in the country surrounding the city. In Giessen, where a Russian field-lazaret for 1,800-2,000 men was erected, the epidemic soon spread to the civil inhabitants.

At Hanau the French retreat was opposed by General Wrede with an army of 50,000 Bavarians and Austrians, a much smaller number than the French had. The two days of fighting that ensued (October 30 and 31, 1813) caused the pestilence to develop murderously. Kopp has given us a good description of this epidemic in Hanau.⁴⁵ Since the beginning of the war the city had always had a military hospital, which lay outside the city. During the battles in Saxony the number of sick and wounded increased, so that it was necessary to erect a second lazaret within the city. Many sick-attendants and sub-surgeons contracted typhus fever, which was prevalent in the hospitals, and several cases also occurred in the city, especially among people who quartered soldiers for money in their homes; many soldiers were thus crowded together in small rooms, and among them were a great many convalescents from Saxon hospitals. The infectious nature of the disease and its consequent dangerousness was shown by the fact that as a rule entire families gradually contracted it, although the epidemic was confined to individual houses. The engagement at Hanau, from which the French emerged victorious, resulted in the unfortunate city being stormed and plundered. 'Even while the battle was going on,' says Kopp, 'a corps of the French army scattered throughout Hanau. This corps had brought with it from Saxony the germ of infection; for the region around Dresden could be looked upon as the great breeding-place where, in view of the enormous assemblage of people representing so many nations, and owing to the concurrence of so many unusual factors, the soil was uncommonly fertile for pestilential diseases.'

⁴⁵ J. H. Kopp, *Beobachtungen über den ansteckenden Typhus, welcher im Jahre 1813-14 in Hanau epidemisch war*. *Hufeland's Journal*, vol. xxxviii, 1814, May vol., p. 8.

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After the engagement a multitude of French prisoners, greatly weakened by hardships and hunger, came to the city. The dissemination of typhus fever was especially helped along by the fact that many poor inhabitants engaged in looting on the battlefield, and took home with them the knapsacks and other effects of the dead. The clothing of the dead came into the possession of those who were charged with burying them, and later got into the hands of the poorest families in the city and in the neighbouring villages. 'I often entered the houses of poor people,' Kopp goes on to say, 'and found the entire family suffering from typhus fever, and on the walls of the low sick-room the uniforms, shirts, and other effects of the dead soldiers would still be hanging.' The result was that the number of patients greatly increased after the battle, and in less than two weeks an epidemic began to develop; at first it was rather mild, but later on it carried away large numbers of people, and lasted until the end of February, having reached its climax in December. From December 1, 1813, to January 4, 1814, 248 people died, whereas the normal mortality for the month of December was but 30. The total number of deaths, including the soldiers, between October 26 and March 1 was 613, while in ordinary years only 125 people died, on the average. The middle class suffered worst of all, while of the upper classes three physicians and several clergymen died. Of the 192 typhus-fever patients that Kopp himself treated, 21 died (10·9 per cent), but these figures do not include a rather large number of very mild cases. People of all ages and both sexes were attacked; children suffered less than adults, while old people and heavy drinkers were the most liable to succumb. The disease lasted from two to three weeks; death usually occurred on the fourteenth to twentieth day, often somewhat sooner.

Frankfurt-on-the-Main suffered terribly in the year 1813 from enforced quartering. Even in the spring, after the newly-organized French armies had passed through the city,

the Frankfurt lazarets were overcrowded with sick and wounded soldiers from Saxony, which was then the scene of the war. Accordingly it was decided in Frankfurt to build barracks adapted to the expected requirements; and in order to protect the city as much as possible from the infection of typhus fever, the barracks were erected outside the city limits, before the Allerheiligen Tor, and were situated in the Pfingstweide along the Main. The building of these barracks was a large and very expensive undertaking, but they undoubtedly served a very useful purpose by protecting the inhabitants for a considerable length of time against the infection of typhus fever.⁴⁶ On September 21 and 22 large numbers of sick and wounded soldiers came to Frankfurt; they filled all the lazarets, and many of them had to be quartered in the homes of citizens. From that time on typhus fever began to spread throughout the city. Fortunately for Frankfurt, the retreat of the French army from Hanau to Mayence passed by the city, since the French generals were afraid that they would be unable to get their troops out of Frankfurt again. On October 29 all the sick and wounded French soldiers in the Frankfurt hospitals were taken out and conveyed by boat to Mayence. The hospital on the Pfingstweide, which had room for 1,480 patients, was immediately cleansed and made ready for the army of the Allies, who were marching into Frankfurt in large numbers. Typhus fever now reached its climax. The arrival of the German and Russian armies almost doubled the number of people in the city; the soldiers were quartered in the homes of citizens and immediately infected them with the pestilence. On January 14, 1814, there were more than 4,000 typhus-fever patients in the city alone, while in the district their number far exceeded 6,000. How the mortality among the civil inhabitants was thereby

⁴⁶ L. Wilbrand, *Die Kriegslazarette von 1792-1815 und der Kriegstypus zu Frankfurt a. M.* Archiv für Frankfurts Geschichte und Kunst. N. F. Vol. xi, p. 96. 1884.

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increased is shown by the following figures, which include only the deaths in the civil population :

July (1813)	.	.	.	.	.	86
August	.	.	.	.	.	83
September	.	.	.	.	.	93
October	.	.	.	.	.	103
November	.	.	.	.	.	328
December	.	.	.	.	.	289
January (1814)	.	.	.	.	.	264
February	.	.	.	.	.	248
March	.	.	.	.	.	212
April	.	.	.	.	.	132
May	.	.	.	.	.	135
June	.	.	.	.	.	76

Four physicians and seven surgeons succumbed to the epidemic in Frankfurt. Of 668 typhus-fever patients taken in by the Hospital zum Heiligen Geist, 100 died. Generally speaking, Frankfurt-on-the-Main fared pretty well, for the reason that most of the patients were housed outside the city; the lower classes, particularly servants and maids, suffered the most. In the city itself the disease was confined chiefly to the narrow streets of the Altstadt. In March and April the pestilence began gradually to abate, and in May it ceased altogether.

After leaving Hanau the retreating French army went on to Mayence and France. The great loss of human life due to typhus fever during the siege of Mayence will be discussed in the tenth chapter. Wiesbaden⁴⁷ was attacked very severely; 800 men are said to have died in the military lazaret there, while of the native inhabitants, who numbered 4,000 at that time, 466 contracted the disease and 141 succumbed to it.

From Mayence the pestilence spread and infected the Rheingau; the outbreak in Oestrich (below Hattenheim on

⁴⁷ J. B. von Francke, *Die Verbreitung der typhösen Krankheiten im Herzogtum Nassau während der ersten Hälfte dieses Jahrhunderts. Mediz. Jahrbücher für das Herzogtum Nassau*, fascicles 12 and 13, p. 18. Wiesbaden, 1854.

the Rhine) is described by Thilenius.⁴⁸ In October sick and wounded French soldiers were taken down the Rhine, and in the latter part of that month 500 soldiers on three boats were held up by a severe storm at Oestrich, where the bad weather compelled them to remain for twenty-four hours. The patients, contrary to orders, left the ships and were taken in by the inhabitants of Oestrich. Before they went away fourteen of them died; a number had already died on the boats. On November 7 five or six citizens of Oestrich contracted the disease; before the 9th more than thirty had been taken sick, and on the 10th there were 93 typhus-fever patients in the city. All told, 330 people in Oestrich contracted the disease, and 103 succumbed to it. In the latter part of November neighbouring places were infected by dispersed French soldiers, by the small lazarets of the troops of the Allies, by visits to the sick, and by participation in funeral ceremonies. Particularly hard hit was the town of Kiedrich, where 336 people contracted the disease and 69 succumbed to it.

As in Oestrich, so in Winkel (near Rüdesheim), according to J. B. von Franque, the pestilence broke out on November 5, 1813, when a boat-load of infected French soldiers was driven ashore there; sixty or seventy of the patients entered the village of Winkel, where they were housed in a schoolroom. Presently a large number of the inhabitants (91 all told) contracted the disease, and 31 of them died. In the small neighbouring community of Espenschied the pestilence broke out in a Prussian military lazaret and spread to all the houses with the exception of one.

Kraft⁴⁹ gives us some interesting information regarding the appearance of typhus fever in Runkel-on-the-Lahn

⁴⁸ H. C. Thilenius, *Beobachtungen über das im Winter 1813-14 im Rheingau epidemisch ansteckende Fieber*. *Hufeland's Journal*, 1815, vol. xli, October vol., p. 3.

⁴⁹ Kraft, *Etwas über den Typhus bellicus und die blaue Nase, eine merkwürdige Erscheinung bei demselben*. *Hufeland's Journal*, vol. xli, 1815, July vol., p. 47.

(above Limburg). This outbreak affords an example of how quickly the pestilence spread in small places. Shortly after the arrival of the Allies, traces of lazaret fever revealed themselves there, and in the latter part of November 1813, several sick soldiers were brought there and housed in the homes of citizens. Presently typhus fever broke out all over the town; in the first part of December the castle at Runkel was converted into a lazaret, and it was very soon filled with patients. The poor allowed themselves to be employed for short periods as sick-attendants, and the result was that they either contracted the disease themselves or else conveyed it to their homes; it was not long before the entire town, as well as the surrounding country, was infected. The convalescents from the military lazarets were not isolated in separate houses, but taken to the surrounding towns and villages (for example, Weyer, Villmar, Münster, and Erfurt), many of whose inhabitants were taken sick. The pestilence raged far and wide; at the climax of the epidemic (February to the middle of March) entire families lay sick, and a great many physicians and surgeons were attacked; the disease disappeared about the middle of May. In Runkel itself, which had 850 inhabitants, 214 contracted the disease and 70 died; the total number of deaths between December 1, 1813, and July 1, 1814, was 94, whereas the normal number of deaths for an entire year was but 17. In the village of Münster, which had 760 inhabitants, 86 were taken sick and 22 died; and in the village of Weyer, which had 727 inhabitants, 179 were attacked and 58 died; the average number of deaths per annum in both villages was 12. As in these small places, so in all the towns and cities the pestilence broke out wherever a sick soldier of either army passed.

From October 28 on, transports of half-dead typhus-fever patients for several days kept arriving at Limburg itself, where they were sheltered in a convent. In only eight days several inhabitants living near the lazaret, and also several sick-attendants and their families, contracted the disease.

In consequence of the quartering of Russian and Prussian troops in the homes of citizens, and also in consequence of the erection of a permanent hospital in the city, into which hundreds of patients were received every day, typhus fever broke out with great severity among the inhabitants; the climax of the epidemic came in January. Of 600 civilians who contracted the disease 76 died.

In the Grand Duchy of Nassau, to which the last-named places (Wiesbaden, Oestrich, Rüdesheim, Runkel, and Limburg) belonged, and which had some 270,000 inhabitants, the number of people who contracted the disease and the number who died from it, according to the reports of the church and town authorities, was recorded for the period between October 1, 1813, and April 1, 1814. According to von Franque, the following figures were compiled in reference to the civil population in the Governmental Districts of that time:

<i>Governmental District.</i>	<i>Due to Typhus Fever.</i>		<i>No. Deaths from all causes.</i>
	<i>No. Patients.</i>	<i>No. Deaths.</i>	
Ehrenbreitstein .	11,522	2,409	3,680
Weilburg .	2,173	419	680
Wiesbaden .	29,349	6,179	8,099
Total .	43,044	9,007	12,459

Altogether, fourteen per cent. of the population were attacked by typhus fever, and three per cent succumbed to it; scarcely a single community was spared.

Epidemics of typhus fever also occurred further down the Rhine; Coblenz, for instance, was severely attacked. According to Bernstein,⁵⁰ a small epidemic broke out in Neuwied in January 1814, having been borne thither by a Prussian corps under General Kleist, which left behind eighty-two sick soldiers, many of them suffering from 'nerve-fever'. The disease spread in a rather mild form throughout the city, but lasted only four weeks.

⁵⁰ J. Th. Ch. Bernstein, *Kleine medizinische Aufsätze*. Frankfurt-on-the-Main, 1814. P. 182 ff.

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Typhus fever likewise appeared in North Germany, which was not directly infected by French soldiers retreating from Leipzig. Hamburg was attacked with great severity. In March 1813, the Russian colonel, Tettenborn, by means of a bold *coup de main* had captured Hamburg, but he was unable to hold it, and on May 30 the French returned. Marshal Davoust erected strong fortifications and drove out all the poorer inhabitants, most of whom had come from the neighbouring Altona, and thus made ready for a long siege, which did not begin until the end of the year, although the blockade was complete by the middle of January. Large quantities of filth accumulated in the streets, since all working-men were employed at the redoubts and hospitals. Food became more and more scarce. 'On such a fertile soil', says Th. Deneke,⁵¹ 'typhus fever flourished. The disease spread rapidly from the hospitals throughout the entire city, since not only were all arrangements wanting for the isolation of the patients, but half-recovered patients were actually discharged from the hospital and quartered in the homes of citizens. Of the garrison, which at the beginning of the siege numbered some 25,000 or 30,000 men, sixty or seventy, at one time as many as 100, died every day between the first part of February and the last part of March, and they were all buried outside the Steintor, close by the town-moat. No less than 10,700 bodies were interred there, 8,200 people having succumbed to typhus fever, and 2,500 to wounds; among those buried were numerous prisoners. Regarding the number of inhabitants that died we have no information. The condition in the hospitals must have been terrible; since there was not sufficient room or the proper facilities to take care of the patients, the physicians and attendants did their duty only under constraint, and the managing officials in many instances grossly abused their authority; one of them,

⁵¹ *Die Gesundheitsverhältnisse Hamburgs im 19. Jahrhundert.* Hamburg, 1901. P. 273. (Presented to the Seventy-third Congress of German Naturalists and Physicians.)

the director of the Legert Military Hospital, for example, ended characteristically by becoming in 1824 the leader of a band of robbers in France.' Seven physicians fell victims to the pestilence in Hamburg. The city did not surrender until May, after the capture of Paris, whereupon typhus fever appears to have disappeared quickly.

From Hamburg typhus fever was conveyed by fugitives in all directions; Altona was attacked with particular severity. As mentioned above, thousands of the poor driven from Hamburg had been received in Altona. 'The people, driven from their homes by fear,' says Steinheim,⁵² 'streamed through our gates and went about seeking shelter. At the same time the gates of Hamburg were closed, and swarms of unhappy people, the dregs of Hamburg's population, straggled with the sad remnants of their property, bent over more by sorrow than by the weight of their burden, through our gates and found protection, nourishment, and shelter in our homes; it was a heart-rending sight.' They were housed, partly in barracks, stables, and barns, and partly in the houses of the lower-class citizens, whose homes were thereby 'so crammed full that not a single corner was left unoccupied by some poor stranger'. More than 17,000 refugees were received in Altona, whose normal population at that time amounted to some 24,000. At the beginning of January, when the very cold weather came (the thermometer often went down as low as - 20 degrees Réaumur), all the cracks and openings in the doors and windows were stopped up to prevent the entrance of the outside air. In the latter part of December 1813, typhus fever broke out in these overcrowded quarters and carried away large numbers of people. The exact number is unknown; according to Mutzenbecher 1,138 fugitives, all told, died in Altona. According to other reports sixty-eight per cent of the patients in the hospital succumbed. The epidemic reached its climax in March, and

⁵² Steinheim, *Über den Typhus im Jahre 1814 in Altona*. Altona, 1815. P. 12.

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with the coming spring it began to abate, partly because it became feasible to house the fugitives in better quarters, and partly because the warmer weather rendered better ventilation possible.

The disease was also conveyed from Hamburg to Eppendorf, but no information regarding the number of deaths there is available.

In Lübeck typhus fever broke out in March 1814, among refugees from Hamburg, and carried away 613 people. According to Gurlt, typhus fever was conveyed to Bremen, partly by the army of the Crown Prince of Sweden, and partly by fugitives from Hamburg; the epidemic is said to have been rather mild.

In Mecklenburg typhus fever began to spread after the erection of a military lazaret in Malchow (October, 1813), and after the erection of a second lazaret by the Swedes in Wittenburg (near Schwerin).

In Kiel typhus fever did not appear until the beginning of the year 1814; Weber⁸² attributed the outbreak there to the Swedish military lazaret, in which physicians and nurses frequently contracted the disease. At first the poorer people were attacked (probably because the sick-attendants were of that class), and later the well-to-do. The pestilence, mild at first, soon became very severe. The disease also broke out in other places in Holstein; Pinneberg was severely attacked, and the disease was also observed in Schleswig. It is remarkable that, according to Weber, no exanthema was observed in Kiel; it must, however, have been present in a scarcely noticeable form, since a rash appeared on the entire skin of convalescents. The disease always began with a chill, and was characterized now by obstinate constipation, now by diarrhoea; no patient who survived the thirteenth day died. And even if an exanthema was not

⁸² Fr. Weber, *Bemerkungen über die in Kiel und der umliegenden Gegend im Anfange des Jahres 1814 vorherrschenden Krankheiten, besonders über den Typhus*. Kiel, 1814.

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observed, there can be no doubt that it was typhus fever which raged in Kiel. Weber himself calls the disease contagious typhus.

4. THE APPEARANCE OF TYPHUS FEVER IN SOUTH GERMANY

Typhus fever was conveyed to various places throughout South Germany by the few soldiers that returned from Russia. Nowhere did it become very widespread, since the authorities soon realized its dangers and prevented it from spreading by means of appropriate measures of precaution. A change took place, however, after the battle of Leipzig, when large numbers of fugitive and captive French soldiers came into the country, and when troops, particularly Russians, kept constantly marching back and forth across the country and spreading the infection. Another important cause of the appearance of the disease there was the fact that lazarets were erected in South Germany during the campaign in France, for the purpose of sheltering the sick and wounded soldiers that were transported back from France.

Regarding the dissemination of typhus fever in Bavaria we are very well informed in a dissertation by F. Seitz.⁵⁴ As among other divisions of troops, so also among the Bavarian division, typhus fever raged extensively. On the march from the Vistula to the Oder thirty or forty men contracted the disease every day, and some of them also suffered from diarrhoea, dysentery, and other diseases; so that when Crossen-on-the-Oder was reached only 113 officers and 2,253 men were left. During the sojourn in Crossen and during the march through Saxony in March, the number of the patients increased, and by the middle of March there were only 1,000 able-bodied men left. Thus they arrived at the Bavarian border. 'The rumour of the wide prevalence of nerve-fever in North Germany,' says Seitz, 'and the apprehension that

⁵⁴ F. Seitz, *op. cit.*, p. 157.

the disease might be conveyed into Bavaria by soldiers returning from the field of battle, had preceded the arrival of the first warriors. Nevertheless people did not wish to forgo the pleasure of sheltering in their homes the soldiers, who had been exposed to so many hardships and privations, and of helping them to forget their past troubles; and in performing this philanthropic duty they lost sight of the necessary caution which prudence demanded.'

The infection of an entire town in Regensburg by a soldier discharged from the hospital in February 1813, and reports regarding infection in other places, resulted in the adoption of strict measures in the border-towns. All returning soldiers if it was suspected that they were infected with disease, were examined on admission, and if the suspicion was confirmed by this commission they were not allowed to be sheltered in the homes of citizens, but were obliged to find shelter in barracks and lazarets, or in suitable buildings outside the town. Patients were sent to the military hospitals of Bamberg, Regensburg, and Plassenburg (near Kulmbach); as soon as these hospitals were filled up, a new one was erected in Altorf. Strict isolation of the patients was enforced, and this prevented the further dissemination of disease among the civil inhabitants. To be sure, some people contracted the disease after coming in contact with a soldier, for example, in Amberg, Sulzbach, Burglengenfeld, Graefenau, Nuremberg, &c. On the other hand, there were many typhus-fever patients in the military hospitals, especially in Bamberg. There typhus fever caused high mortality among the soldiers; but, thanks to strict measures of precaution, only a few civilians were taken sick (about 100 out of 20,000 inhabitants), while of several physicians who contracted the disease only two succumbed to it. At the middle of the year 1813 typhus fever disappeared in the town, without having demanded many victims. The 'nervous fevers', which were prevalent during the summer (for example, in Regensburg from July to September), are

not regarded by Schäfer as contagious, and must be looked upon as cases of typhoid fever.

In November, on the other hand, after the battles near Leipzig and Hanau, typhus fever broke out suddenly in many places in Bavaria, and in December raged furiously. The orders, issued in the spring of 1813, prohibiting all persons suspected of carrying disease from crossing the borders could no longer be enforced. Says Seitz : ⁵⁵ ' When French prisoners began to march across the country on their way from Saxony and Würzburg to Bohemia, the pestilence spread among the inhabitants of the cities and of the flat lands. Typhus fever raged in its most terrible form among these poor prisoners of war ; many succumbed to it in various places along the route, and thousands died in the hospitals. That the disease, which haunted all defeated armies like a ghost, would necessarily reap an abundant harvest among them, was clear to every physician who observed the physiognomies of these warriors as they were being led away in captivity from the vicinity of their fatherland into remote regions. Their pale faces and emaciated forms bore witness to hunger and sorrow, to a long deprivation of the usual necessities of life and to lack of vital energy, to exhaustion caused by the long marches from Hanau to Leipzig, when in the ardent struggle to reach their fatherland they had used up their last ounce of strength. Whosoever was brought by profession, sentiment, or curiosity into contact with these unfortunate soldiers sooner or later contracted the disease. Physicians, police-officers, servants, national guards (who watched over the prisoners), country-people (who carried the patients), messengers (who brought food to the soldiers in their quarters), were as a rule the first to be attacked.'

The Grand Duchy of Würzburg was next attacked. In Würzburg itself, where there were 2,000 or 3,000 French patients in the hospitals, the pestilence broke out furiously

⁵⁵ F. Seitz, *op. cit.*, p. 174 ff.

wherever the soldiers went. In Miltenburg more than 100 persons contracted the disease in the latter part of December; in the district of Mellrichstadt the number of typhus-fever patients was 429 (121 deaths), and in the district of Bischofsheim there were 1,067 patients and 328 deaths. According to Seitz, the number of deaths throughout the entire Grand Duchy of Würzburg, which at that time had a population of 344,500, was 2,500, while no less than 16,000 people contracted the disease. In Nuremberg the pestilence did not become very widespread; it broke out in the first part of November and lasted until the middle of January; 150 persons, all told, contracted the disease. Dinkelsbühl was severely attacked; in the month of November a large number of French prisoners suffering from typhus fever and diarrhoea were housed there in the Carmelite Monastery, and in a short time some 200 of them died. Between the 25th and 30th of November typhus fever spread to the civil population, and, in a few days, more than 100 people contracted the disease and 10 died; the number of patients increased until December 12, and then decreased, until the pestilence disappeared in the latter part of January; 448 persons, all told, contracted the disease and 89 succumbed to it. In the middle of November it was conveyed by a transport of French prisoners to Bamberg, where it spread with such fearful rapidity in the military hospital there, that twenty persons died every day and all the sick-attendants and medical assistants contracted it. The disease soon spread throughout the city, even infecting people who had in no way come in contact with the sick prisoners. Epidemics of typhus fever were reported in twenty-one villages in the surrounding country.

All Upper-Franconia, through which transports of prisoners were taken to the Bohemian border, suffered terribly from the pestilence. The disease was first observed in the towns and villages lying to the north of Bamberg, whither it had been conveyed by dispersed troops immediately after the

battle of Leipzig (in Nordthalben, Hof, and other near-by villages). Later on it also appeared in the districts further south. The region between Bayreuth and Münchberg was, comparatively speaking, less severely attacked. On the other hand, typhus fever raged furiously in the military hospital on the Plassenburg, where at the end of December there were some 700 persons suffering from the disease. In Kulmbach, a town lying at the foot of the mountain, more than 100 persons contracted the disease.

While French prisoners were bringing typhus fever into the country from the west, Austrian and Russian troops were also bringing it from the east. To be sure, the authorities were enjoined to restrict the foreign troops to the use of ten military roads that passed through the country, but the Austrian and Russian leaders frequently ignored these instructions. Consequently the pestilence spread over the entire region, a fact which Seitz confirms with numerous specific instances; regarding the extent to which it raged in Munich, he gives us no information.

Typhus fever was conveyed to Regensburg by French prisoners. 'Toward the end of the month [December],' says Schäfer,⁶⁶ 'typhus fever was conveyed to Regensburg by French prisoners, some of them sick and some of them well, but all of them scantily clad and half-starved. They were quartered in the dance-halls, and those that were sick were taken to a convent which had been hastily converted into a hospital. There the civil inhabitants, owing to the lack of appropriate arrangements, were obliged to distribute food among the sick, and the result was that the fever finally became general. Not until then was the advice which the physicians had given at the beginning heeded; they had urged, namely, that the patients should be cared for by the hospital-attendants themselves, that each one should have his own separate attendant, and that only

⁶⁶ J. Schäfer, *Die Zeit- und Volkskrankheiten des Jahres 1813 in und um Regensburg*. *Hefeland's Journal*, vol. xxxix, 1814, p. 73.

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those persons should be allowed to enter the hospital whose presence was absolutely necessary.' By February, according to the official report, 308 persons, all told, contracted typhus fever in Regensburg, and 51 succumbed to it.

In Ingolstadt an unusually severe epidemic broke out after the arrival of the French prisoners. In the first part of December the number of prisoners that died every day was no less than ninety, but after the middle of the month the mortality was somewhat lower. On December 18 there were 845 typhus-fever patients in the hospitals, and the number of deaths on this day amounted to only twenty-seven. From then to the end of the month only fifteen or twenty persons died per diem. On December 10 several civilians contracted the disease; on December 18 the number of civilians suffering from the disease was thirty-six, and about an equal number on December 30. The total number of deaths among the prisoners of war amounted to 2,000. Typhus fever also appeared along the Danube on both sides of Ingolstadt.

In the course of the winter, typhus fever was also borne into southern Bavaria by Austrian troops; it broke out in the towns along the military road, e. g., in Vöcklabruck, Traunstein, Rothenheim, and Landsberg. Places which the soldiers did not visit were also attacked by the pestilence. In Weilheim (west of Lake Starnberg) the disease broke out repeatedly after soldiers had marched through the place; up to April 8 no less than 885 persons had contracted the disease there, and some 100 had succumbed to it.

According to Seitz, 18,427 cases of the disease and 3,084 deaths attributable to it were officially recorded in Bavaria between October 1813 and June 1814; the lists kept by the Governmental Districts were undoubtedly very incomplete, but on the other hand we must assume that the contagious and non-contagious 'nerve-fevers' (typhus and typhoid) were not always distinguished. For the several districts Seitz furnishes us with the following figures relating to the

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number of people who contracted and succumbed to typhus fever :

<i>The Region of the</i>	<i>No. Patients.</i>	<i>No. Deaths.</i>
Main	5,752	1,067
Rezat	2,135	32
Regen	1,627	290
Upper Danube . .	4,613	1,003
Lower Danube . .	1,338	270
Salzach	1,815	259
Isar	1,147	163

This does not include the number of deaths among the prisoners of war, nor among the native and foreign soldiers. For the Main region, Seitz also furnishes figures relating to the age of the patients ; of the 5,752 persons who contracted the disease 453 were children, 1,345 were young men and women, 3,657 were of middle age, and 297 were old men and women.

As in Bavaria, so also in Württemberg, typhus fever broke out in two epidemics ; the first, which was less extensive and less severe, was caused by soldiers returning from Russia, and the second broke out in consequence of the passing of troops through the country after the battle of Leipzig. According to Elsässer,⁵⁷ in the first part of the year 1813 there were 165 cases of typhus fever and twenty deaths due to it reported from fifteen different localities. In the month of July the disease disappeared from Württemberg. At the end of the year 1813, however, the disease was again borne into the country, partly by French prisoners, and partly by Russian soldiers. 'Throughout Württemberg', says Lohnes,⁵⁸ 'this fever appeared wherever foreign troops had tarried. Consequently contagious typhus first appeared in the northern lowlands, while the region around Tübingen and the southern and eastern part of the country at the

⁵⁷ J. A. Elsässer, *Beschreibung der Menschenpockenseuche, welche in den Jahren 1814, 1815, 1816, und 1817 im Königreich Württemberg geherrscht hat.* Stuttgart, 1820.

⁵⁸ J. H. B. Lohnes, *Dissertatio inauguralis medico-chirurgica de utilitate Hydrargyri in febre typhoide inflammatoria.* Tübingae, 1814.

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beginning did not suffer at all. But in December, when large bodies of troops marched through the highlands, the southern part of Württemberg, these fevers followed the soldiers' lines of march. At first it was the French prisoners who carried lazaret-fever with them wherever they went, and a very severe form of the disease too; later on, these fevers always broke out wherever the Russian soldiers went, although very few of the soldiers themselves were infected with them. Frequently persons contracted the disease who had no sick soldiers in their homes. As a rule the disease in such cases was mild, but it was very dangerous wherever patients were left or congregated in large or small hospitals.'

As early as the month of February, the disease had reached its climax in Württemberg; in March it began to abate rapidly, so that in the first part of the summer only 150 patients could be counted in fifteen Governmental Districts. From then until the end of the year it broke out only sporadically. Braun,⁵⁹ who asserts that more than half of the physicians in Württemberg contracted typhus fever, mentions the names and residences of seventeen physicians who succumbed to it; we see from this list that the disease was prevalent throughout all Württemberg. The disease was also conveyed to the southern part of Upper Swabia. According to Dillenius, 1,300 sick soldiers were sent in the first part of the year 1814 from France (especially from Mülhausen in Alsace) to the military hospital at Tettnang; twenty-four of them died on the way, and in the course of the following four months five times as many succumbed to typhus fever in the hospital.⁶⁰

Baden suffered severely from typhus fever; in Karlsruhe, for instance, typhus fever raged from October to December 1813. But Baden suffered particularly, for the reason that

⁵⁹ F. E. Braun, *Medizinisch-praktische Ansicht der Jahre 1813 und 1814*. Tübingen, 1816.

⁶⁰ C. von Dillenius, *Beobachtungen über die Ruhr, welche im Russischen Feldzug 1812 in der vereinigten Armee herrschte*. Ludwigsburg, 1817.

all the sick soldiers in the Bohemian army were sent back there from France. Their number far exceeded all expectations, since typhus fever was uncommonly prevalent in the field army in France, and the soldiers arriving from there infected the hospitals. Even when the Austrian and Russian troops marched through the country the number of 'nerve-fever' patients was very large. Freiburg im Breisgau, at that time a city of 9,000 inhabitants, suffered very severely in consequence of enforced quartering; some 210,000 soldiers were housed in the homes of its citizens. In the garrison lazaret and university hospital, which together had room for 500 patients, no less than 1,200 patients were crowded together in December 1813; almost all of them were suffering from diarrhoea and typhus, and owing to the lack of linen they were compelled to lie in their own dirty clothes on sacks of straw. Every morning two large wagonloads of dead bodies were driven away for burial. As usual, the pestilence spread to the civil population, carrying away entire families. On October 12, 1813, the former Abbey of Thennenbach was converted into a military lazaret, in which two weeks later some 1,200 patients were sheltered, although it had adequate room for only 700. Between December 27, 1813, and March 1814, 567 soldiers succumbed there, most of them to typhus and dysentery. The epidemic reached its climax about the middle of January, when as many as thirty persons died per diem. After the middle of January the number of deaths rapidly decreased.⁶¹ Northern Baden was also attacked. In Mannheim the sick and wounded French soldiers who arrived after the battles of Lützen and Bautzen were led around the city and taken to Spires. Thus typhus fever did not appear in Mannheim itself, where the condition of health was subsequently also good. The statement of the *Rheinische Merkur*, that out of 13,000 patients in the military lazarets in Mannheim 3,347 died, according to

⁶¹ F. Schinzinger, *Die Lazarette der Befreiungskriege 1813-15 im Breisgau* Freiburg im Breisgau, 1907.

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Gurlt,⁶² is incorrect; the number of deaths was no more than 346.

Regarding the total number of deaths due to typhus fever in Baden no information is available; at all events it was very large. This is shown by the fact that in the last part of 1813 and first part of 1814 no less than thirty-five physicians and thirty surgeons of the first class fell victims to the pestilence.⁶³

In November 1813, thousands of scattered French prisoners came to Darmstadt; many of them were suffering from typhus fever, which soon spread throughout the city. Many places in that part of the present Grand Duchy of Hesse which lies south of the Main were severely attacked by the epidemic; as many as 2,000 or 3,000 inhabitants of many places contracted the disease. But by July 5, 1814, it had everywhere disappeared.⁶⁴

5. TYPHUS FEVER ON THE LEFT BANK OF THE RHINE; FRANCE AND SWITZERLAND

The continued retreat of the French army passed from Mayence through Metz to Paris, and the route of the retreat was marked by patients left behind. In this way the epidemic of typhus fever was quickly transplanted to the north-eastern part of France. Alsace-Lorraine, the Palatinate, Champagne, and Burgundy were all attacked in succession. The epidemic raged from Kreuznach to Strassburg; the dispersion of the retreating army caused even the smallest villages to suffer, so that the pestilence appeared in Worms, Frankenthal, Spires, Oppenheim, Neustadt-on-the-Hardt, Dürkheim, Landau, Alzey, Trarbach, Zweibrücken, Weissenburg, Hagenau, Zabern, and in other places. Mörs (near Frankenthal) was

⁶² Gurlt, *op. cit.*, p. 696.

⁶³ Supplements to the statistics relating to the Grand Duchy of Baden, fascicle 2, p. 185.

⁶⁴ Gurlt, *op. cit.*, p. 646.

almost completely wiped out.⁶⁵ The following places in France are mentioned as having been attacked by the pestilence : Saint-Avoid, Courcelles-Chaussy, Mars-la-Tour, Sierck, Cattenom, Pont-à-Mousson, Toul, Nancy, Étain, Verdun, Bar, Longwy, and Sedan. Thouvenel describes the epidemic of typhus fever in Pont-à-Mousson, which broke out in December 1813, when transports of sick soldiers arrived there, and spread to all the surrounding towns and villages ; it increased in severity until the middle of March, and by June had almost disappeared. He describes in emotional language the endless succession of wagons that arrived every day : ⁶⁶

Who of us will not remember as long as he lives those harrowing scenes, which one cannot describe without shuddering ? Who will ever forget those hundreds of wagons filled with unhappy wounded men who had had no medical care since leaving Leipzig ; and packed in with them were sick men suffering from dysentery, typhus fever, &c., almost all of them dying of inanition, weakness, and filth, as well as of disease. Those unfortunate men piteously begged only for a place in a hospital already filled with dying men, only to receive in reply a forced refusal. And so they were under the cruel necessity of going further to die, with the result that they infected all the towns and villages along their route, wherever they were granted a generous hospitality.

Strassburg, comparatively speaking, suffered but little. As early as December 1, the prefect of Strassburg had issued orders that a special building should be set aside in every town for the reception of sick soldiers that arrived there, and that they should under no circumstances be housed in the homes of citizens. In October and November convalescents had been quartered in the residences of citizens, who had subsequently been infected. In November the number of typhus-fever patients, which averaged ten or fifteen per month, increased to thirty-six, and in December to 100. In accordance with the above-mentioned decree all

⁶⁵ Kopp, *Jahrbuch der Staatsarzneykunde*. Jahrgang 7. 1814. F. 200.

⁶⁶ P. S. Thouvenel, *Traité analytique des fièvres contagieuses et sporadiques, simples et compliquées, qui ont régné dans le Département de la Meurthe vers la fin de 1813 et au commencement de 1814*. Pont-à-Mousson, 1814.

newly-arrived soldiers were examined by a Board of Health ; the sick were sent to the hospital, and the healthy were quartered with citizens. 'Notwithstanding this,' says Reisseisen,⁶⁷ 'the healthy ones infected a large number of inhabitants through their old woollen overcoats, which were thoroughly saturated with the miasma of the hospitals. The clothes that were sold privately were particularly dangerous, so that in the latter part of December strict orders were issued to keep watch for the old clothes and burn them. In the first part of January, when the rather lax siege began, typhus fever spread irresistibly throughout the city ; in that month the pestilence reached its climax with 175 deaths. On January 22 the prefects ordered general fumigations in all public buildings, and recommended that the citizens should also fumigate their homes. The result was very successful ; in February 112 people died, in March 75, and in April 27, and then typhus fever disappeared. No foreign troops marched through the stronghold, and although all the French prisoners of war passed through the city, no more citizens were infected by them, for the reason that they were quartered in the fortifications.

The devastation caused by the pestilence in Metz was no less than frightful. Maréchal and Didion⁶⁸ give us a picture of this severe epidemic. On November 19, 1813, some 5,000 sick soldiers were assigned to that city ; it was necessary to see that they were sheltered, and at the same time measures were adopted to prevent the disease from spreading. According to the report of the astute Mayor of Metz, Baron Marchant, the 5,000 soldiers, all of them suffering from an infectious disease, arrived, and sixty of them died every day. All the physicians in Metz contracted the disease, and several of them died. It was impossible to procure sick-attendants, since those who had performed this

⁶⁷ Reisseisen, *Strassburger Brief vom 22. August 1814. Kopp's Jahrbuch der Staatsarzneykunde. Jahrgang 7. 1814. P. 425.*

⁶⁸ Maréchal et Didion, *op. cit.*, p. 298.

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service had all contracted the disease, conveyed it home, and infected their families. Sick soldiers who were quartered privately, and particularly convalescents, also helped to spread the disease throughout the city; more than 150 houses were infected. In the latter part of December the number of patients greatly increased. On January 1, 1814, after Blücher had crossed the Rhine, the Germans marched against Metz, and then an enormous crowd of people from the surrounding country fled to that city for protection. This caused typhus fever to spread far and wide throughout the city. Furthermore, sick and exhausted soldiers were constantly being sent to Metz, and it is estimated that some 30,000 of them arrived there. The worst month was February, and 7,752 soldiers, all told, died in six months :

November	.	.	.	.	.	463
December	.	.	.	.	.	1,602
January	.	.	.	.	.	1,350
February	.	.	.	.	.	2,365
March	.	.	.	.	.	1,622
April	.	.	.	.	.	340

1,294 civilians also died, the largest number (371) likewise in February. In the entire Department of Moselle, which at that time had some 400,000 inhabitants, no less than 10,329 people succumbed to this epidemic, and this number does not include the soldiers.

Regarding the wide dissemination of typhus fever in the Departments east and south of Paris, which formed the scene of the war in the first part of the year 1814 (the Departments of Haute-Marne, Côte-d'Or, Aube, Yonne, Marne, Seine-et-Marne), no further information is available. Troyes, Besançon, Dijon, Avallon, and Auxerre are mentioned as places that were attacked by the pestilence.

In Paris, cases of typhus fever occurred in February, when the war moved closer to that city. The sick and wounded soldiers were consequently obliged to go to the hospitals in Paris; but since these were neither large nor numerous enough to accommodate so many patients, it

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became necessary to open several provisional hospitals in appropriate buildings. At first all the typhus-fever patients were taken to the Hôpital de la Pitié, but it soon became necessary to change this policy, since the disease had spread throughout all the wards of that building. In the latter part of February the first cases of typhus fever appeared in the city, in consequence of the return of many soldiers to their own families. In March more and more people contracted the disease, which toward the end of the month was raging furiously, though more in the hospitals than in the city. In the Hospice de la Salpêtrière, which had been converted into a military hospital and began to be used on February 9, 1814, a small number of persons contracted typhus fever in the latter part of March, and in the months of April and May the disease spread; after that, however, it began to abate. A great many nurses and attendants were taken sick.⁶⁹ In April a large number of people in the city were lying sick with typhus fever. In one boarding-school, from which several persons visited the hospitals and brought typhus fever home with them, thirty people contracted the disease and four succumbed to it. In May cases of typhus fever became more rare, and in August no more people contracted the disease. The mortality in Paris in the year 1814 was very high; whereas in the years 1812 and 1813 the number of deaths had been 20,133 and 18,676 respectively, in the year 1814 no less than 27,778 people died, which number includes 2,559 soldiers that died in the hospitals. In the year 1815 the number of deaths decreased again to 19,992. How large the number of deaths due to typhus fever was, it is impossible to state with certainty, since in the case of only a small number of the persons who actually died of typhus fever was that disease recorded

⁶⁹ B. Pellerin, *Considérations sur les maladies qui ont régné à l'hospice de la Salpêtrière dans les premiers mois de 1814 pendant lesquels les militaires malades ont été admis dans cet hospice*. Paris, 1814.—M. Friedländer, *Notice sur la dernière épidémie du typhus*. *Gazette de santé ou Recueil général et périodique*. Année 42. Paris, 1815. P. 89.

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as the cause of death. The rubric 'fièvres putrides et adynamiques' increased in the year 1813 from 1,337 deaths to 2,860 deaths, and the rubric 'fièvres malignes ou ataxiques' from 804 to 1,376.⁷⁰

Owing to the overcrowded condition of the hospitals in Paris, soldiers were conveyed upon a number of boats on the Seine to Rouen. Since sick and wounded men were thus transported together, typhus fever was conveyed to Rouen, where it carried away large numbers of persons employed in the hospitals. In the same way, sick and wounded were transported to points on the Loire, causing typhus fever to spread to Tours, where 860 soldiers succumbed to it.⁷¹

The proximity of the scene of the war in January and February 1813 caused typhus fever to break out in the Swiss Cantons lying close to the French border; for example, in the cantons of Basel-Stadt, Basel-Land, Neuenburg, Solothurn, and Waadt. The number of deaths in these cantons was: ⁷²

Year.	Basel-Stadt.	Basel-Land.	Neuenburg.	Solothurn.	Waadt.
1812 . .	442	857	1,041	1,349	3,705
1813 . .	425	746	1,014	1,072	3,186
1814 . .	721	1,679	1,335	1,844	3,475
1815 . .	479	812	1,220	1,240	3,267
1816 . .	355	710	1,234	—	3,720

According to A. Burckhardt,⁷³ lazaret-fever broke out in Basel with extraordinary fury when the Allies passed through that city; it raged particularly among the foreign soldiers, but also attacked the attendants in the hospitals and the civil inhabitants. The number of deaths caused by it is unknown.

⁷⁰ *Gazette de Santé*, etc. Année 41. Paris, 1814, and Année 42, 1815.

⁷¹ A. Laveran, op. cit., p. 255.

⁷² *Ehe, Geburt und Tod in der schweizerischen Bevölkerung während der 20 Jahre 1871-90*. Third Part. First half, p. 195. Bern, 1901.

⁷³ A. Burckhardt, op. cit., p. 48.

6. TYPHUS FEVER IN AUSTRIA IN THE YEARS 1813-14.⁷⁴

The country in Austria which was most exposed to the ravages of the epidemic of typhus fever was Bohemia, along whose borders the war was for a long time carried on. As early as February 1813, 'nerve-fever', accompanied by petechiae, was borne by Bavarian and Prussian troops into the district of Königgrätz, but thanks to energetic and strict measures of precaution, it did not become very widespread. The principal outbreak of the epidemic in Bohemia took place in the autumn of the year 1813. The number of typhus-fever patients taken into the Prague hospital in September 1813 was 39, in October 77, in November 196, and in December 287.⁷⁵ The region along the Saxon border suffered the most: e. g. the districts of Leitmeritz, Saaz, Rakonitz, and Elbogen. In the Leitmeritz district typhus appeared in August, and became more severe in September and October; the places along the military road leading from Dresden to Prague were particularly hard hit. The epidemic lasted until April. In the near-by Kaurzim district sick and wounded soldiers of all nations arrived, after the battles of Pirna, Dresden, and Kunen, causing a virulent epidemic to break out everywhere; in these places all the inhabitants contracted it. In the latter part of the year, when the pestilence seemed to have abated a little, it broke out anew when the French garrison was being taken from Dresden to its place of detention; in fourteen days 2,422 persons in sixty places contracted the disease, which disappeared in May. Typhus fever had spread over 103 localities, all told, in that region, and of 8,066 people who contracted it, 751

⁷⁴ Historical Survey of the health-conditions in Austria, Styria, Carinthia, Moravia, and Bohemia, in the years 1813 and 1814. Information taken from the *Hauptsanitätsberichte der Landesstellen*. Observations and discussions by Austrian physicians regarding practical therapeutics, vol. ii., p. 1. 1821.

⁷⁵ Compare also J. R. Bischoff, *Beobachtungen über den Typhus und die Nervenfeber nebst ihrer Behandlung*. Prague, 1814.

succumbed. In the Saaz district typhus broke out in the last part of October 1813, and carried away large numbers of people ; it raged all along the military road in the vicinity of the scene of the war. The highest mortality was in the month of December, and in May the pestilence disappeared. In the Rakonitz district entire communities lay sick in the first part of the year, but in April no new cases of the disease occurred. In the Elbogen district typhus fever broke out in September 1813 in the city of Eger, in consequence of the arrival of French prisoners and fugitives ; the epidemic soon spread over the entire district, and lasted until March 1814.

The rest of Bohemia suffered less severely from typhus fever in the winter of 1813-14. In the Beraun district, lying to the south-west of Prague, it began in October 1813, when the homes of the citizens became crowded with convalescing soldiers ; the epidemic came to an end in March 1814. The number of people who contracted the disease was 3,807, while the number who succumbed was 296. The adjacent districts of Pilsen and Kattau were likewise attacked ; in the Pilsen district typhus fever broke out in October 1813, in consequence of the arrival of French prisoners ; a number of places were infected by them, so that in November and December it developed into an epidemic, which lasted until April. Of 1,185 people who contracted the disease, 237 died. In the Kattau district 645 contracted the disease and 132 succumbed.

In the eastern part of the country the districts of Tabor and Czaslau were severely attacked. ' In the Tabor district ', we read in the above-mentioned report,⁷⁸ ' there appeared in the month of August at Neuhaus, where a field-hospital had been erected, several biliary-mucous nerve-fevers, which broke out in numerous places along the road to Prague, soon spread to the Tabor district, and became epidemic. They quickly revealed their presence in all places where sick soldiers passed the night, or where the natives took part in

⁷⁸ *Historical Survey*, p. 84.

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the transportation of sick soldiers.' The climax of the epidemic was in January, and in the middle of May it disappeared; of 4,267 people who contracted the disease, 448 succumbed. In the Czaslau district, adjacent to the Tabor district on the north, the disease was disseminated in November 1813 by transports of prisoners and troops, by the quartering of convalescents in the homes of peasants, and by peasants who helped to transport sick soldiers. On December 16, 1813, no less than 4,313 civilians in thirteen places were suffering from typhus fever. The highest mortality prevailed in the vicinity of the hospitals; the epidemic disappeared with the arrival of spring.

Typhus fever was also conveyed into various parts of Moravia,⁷⁷ partly by Austrian troops, and partly by French prisoners; in the districts of Brünn, Iglau, Olmütz, and Teschen it broke out in numerous places. In twelve communities in these districts, having a combined population of 28,267, some 2,126 people contracted the disease between December 1813 and the summer of 1814, and 207 persons succumbed. In March the epidemic disappeared almost everywhere. According to the figures compiled by J. Hain,⁷⁸ the number of deaths in Moravia and Austrian-Silesia together was:

July (1813)	.	.	.	.	.	3,818
August	.	.	.	.	.	3,893
September	.	.	.	.	.	3,888
October	.	.	.	.	.	4,059
November	.	.	.	.	.	4,457
December	.	.	.	.	.	5,202
January (1814)	.	.	.	.	.	8,280
February	.	.	.	.	.	7,249
March	.	.	.	.	.	7,756
April	.	.	.	.	.	5,464
May	.	.	.	.	.	5,541
June	.	.	.	.	.	4,147

⁷⁷ J. Steiner, *Über den Gesundheitszustand in Mähren im Jahre 1814. Beobachtungen und Abhandlungen aus dem Gebiete der gesamten praktischen Heilkunde von österreichischen Aerzten*, vol. i, p. 88. 1819.

⁷⁸ J. Hain, *Handbuch der Statistik des österreichischen Kaiserstaats*. Vienna, 1852. Vol. i, p. 78.

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In Lower Austria typhus fever also broke out, particularly in Vienna; the number of deaths there was:

	<i>Due to typhus fever.</i>	<i>All deaths.</i>
1813 . . .	784	12,971
1814 . . .	1,529	15,309

In the rest of the country few diseases appeared, despite the fact that troops kept marching back and forth.

Typhus fever was conveyed by marching troops to Styria also; the source of the pestilence was the seven military hospitals in Graz. We read in the report:⁷⁹ 'The pestilence, proceeding principally from the seven military hospitals lying within the city limits as from a focus, was spread abroad by convalescents, attendants, physicians, &c. The mortality in these hospitals was extremely high; the buildings set aside for the purpose could scarcely accommodate the number of sick. Everything was topsy-turvy; the corps of field-doctors on hand was not nearly large enough to take even the most necessary care of the large number of patients.' The region around Graz, Marburg, and Bruck was most severely attacked by the disease, which also spread to Carinthia and broke out in Klagenfurt and vicinity.

7. SURVEY OF THE EPIDEMIC OF TYPHUS FEVER IN THE YEARS 1813-14

It is impossible to draw an accurate picture of the loss of human life which typhus fever caused in the years 1813-14. This is due, on the one hand, to the lack of reliable statistics, and, on the other hand, to the fact that the several regions suffered to a varying degree, depending upon the number

⁷⁹ *Historical Survey*, p. 182. In *Hufeland's Journal* (Jahrgang 1814 and 1815. Vols. xxxii-xxxiv) there is general survey of the copious literature of that time regarding infectious nerve-fever; it comprises several hundred numbers. Many publications are only of a theoretical nature and deal only with the character of the disease and do not aim at offering descriptive data; only a few contain usable information regarding the duration and extent of the epidemic in the individual localities.

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of troops, prisoners, and refugees that they received. The number of persons that succumbed to typhus fever in Germany during the years 1813-14 must be estimated at least as high as 200,000 or 300,000. Assuming that 200,000 people succumbed to the disease, the number that contracted it would amount to some 2,000,000. Since Germany at that time had hardly more than 20,000,000 inhabitants, some ten per cent of them, on the basis of this assumption, contracted the disease. The size of this number is significant, when we consider that the stronger and older people manifested particular susceptibility to the disease.

One of the chief causes of the wide dissemination of typhus fever in the years 1813-14 was the imperfect development of the lazaret system. If at first a lazaret for infectious diseases was available, the number of patients it was called upon to accommodate in a few days became so large that new buildings always had to be opened for them, and it was impossible to keep them isolated. The efforts of the various municipal administrations to have the lazarets erected outside the city limits were powerless against the brutal obstinacy of the French, and, later, of the Russian generals. The severity of the penalty which they had to pay for uncereemoniously housing infected French troops in strongholds together with healthy men, is evident from the fearful devastation caused by typhus fever in Danzig, Torgau, Mayence, &c. The little communities were absolutely helpless against the dominating power of the soldiers. One might reproach the municipal administrations of that time with failing to adopt measures of prevention against the menacing danger of pestilence, particularly in places which did not suffer in consequence of the marching back and forth of soldiers. But one must take into account the excitement which permeated the entire people at that time—the hopeful longing to be freed from the national enemy's long oppression, toward which all thinking and planning was directed, the employment of all resources for this

purpose, and in particular the fact that sheer ignorance rendered appropriate measures impossible. If this ignorance prevailed in the highest places, nothing better was to be expected of the administrations of the smaller cities and towns. The population was therefore everywhere defenceless against the intrusion of the pestilence, which was given an opportunity to become more and more widespread. This, however, had not been the case in Central Europe since the Thirty Years' War.

CHAPTER VII

FROM THE AGE OF NAPOLEON TO THE FRANCO-GERMAN WAR

1. THE RUSSO-TURKISH WAR OF 1828-9

ON April 28, 1828, Russia declared war against Turkey; the fighting took place partly in the Balkan Peninsula, in Wallachia and Bulgaria, and partly in Transcaucasia. In the western scene of the war, the Russians, after the capture of Varna and the futile siege of Schumla in the campaign of the year 1828, were obliged to retire to the left bank of the Danube; in the second campaign (1829) Diebitsch defeated the Turks at Kulevtchi, marched across the Balkan Peninsula, and appeared unexpectedly at Adrianople, which the Turks surrendered to him without resistance.

An unusually severe epidemic of bubonic plague accompanied this campaign. In the year 1828 plague had spread from Asia Minor to European Turkey and Wallachia; as early as 1825 and 1826 it appeared in Bucharest, while sporadic cases of the disease occurred in Wallachia in the summer of 1827 and in the winter of 1827-8.¹ On April 30, 1828, the first Russian troops made their appearance in Bucharest; they were quartered in the city itself and in the surrounding villages. On May 13 seven cases of plague appeared in a private house, but the Bucharest physicians did not hold the disease to be plague. Orders to disinfect the houses were issued, but intercourse with the surrounding villages was not stopped. Some thirty inhabitants succumbed to the pestilence in May, and at the end of that month three Russian soldiers were allowed to enter the city. Since the number of cases in the city was increasing, the

¹ Czetyrkin, *Die Pest in der russischen Armee zur Zeit des Türkenkriegs im Jahre 1828 und 1829*. Translated from the Russian. Berlin, 1837. P. 1.

troops stationed there were quartered in the village of Fundeni, where, however, several more people soon contracted the disease. During the month of May, plague broke out in other villages of Wallachia, and in the course of the summer and autumn it spread throughout the entire country. In regard to the origin of this epidemic of plague, Simon² says: 'All Wallachia was infected from the year 1826; but had it not been for the war and the consequent afflictions of all kinds, the disease would not have developed in the year 1828 into such a furious and extensive epidemic. The arrival of the Russians was responsible for this widespread outbreak, since they carried the infection contracted from the inhabitants to a thousand different places.'

The removal of the troops to Fundeni temporarily checked the dissemination of plague in Bucharest, but in the middle of August it broke out again, presumably in consequence of the arrival of more troops from the scene of the war; some thirty or forty villages were attacked by this epidemic, which lasted until the middle of November. In January 1829, plague was conveyed by troops to Moldau and Jassy, which they were to make their winter quarters; but the disease, notwithstanding the fact that it was wrongly diagnosed and declared to be typhus fever, was soon checked by energetic measures of precaution. Regarding the number of plague patients in the Russian army, which was also attacked by several other diseases, especially malaria, diarrhoea, dysentery, and fever, no information is available; the Russian army numbered 150,000 men, and, according to Seidlitz, 134,882 men were received into the lazarets and 75,226 men into the regimental sick-rooms up to the end of February 1829; thus 210,108 men contracted disease in a period of ten months.³

In March 1829, plague broke out anew. Surgeon-General

² Seidlitz, Petersenn, Rinck, und Witt, *Medizinische Geschichte des Russisch-türkischen Feldzugs in den Jahren 1828 und 1829*. New edition by F. A. Simon. Hamburg, 1854. P. 27.

³ *Ibid.*, p. 88 ff.

Witt, who had his head-quarters in Jassy, declared that the disease was not plague, but an endemic fever, and put an end to all measures of precaution in March. 'After the patients were no longer quarantined,' says Czetyrkin,⁴ 'the disease, bringing destruction in its train, in the spring and summer began to make headway and spread over Moldavia, Wallachia, and Bulgaria; it also accompanied the Russian army across the Balkan Peninsula and appeared in Rumelia, where it completely wiped out several hospitals. Those divisions of the army which were kept constantly on the march and were thus exposed to the fresh air, rain, and dew, suffered less severely; but the garrisons in the cities and strongholds were more furiously attacked by the dreaded enemy. The overcrowded condition of the lazarets, the lack of competent nurses and physicians (most of whom were exterminated by plague), the uncertainty regarding the nature of the disease—all this constituted the reason why the pestilence could not be checked.'

The disease first appeared in March 1829 throughout Wallachia, but after the middle of May it also revealed its presence south of the Danube; Galatz, Babadag, Kustendji, Mangalia, Bazardschik, and Kavarna were attacked in succession.

Varna suffered very severely; according to Petersenn, the first cases occurred there in May 1829, in the infantry regiment Witepsk. The patients were housed in tents on the sea-shore outside the city, and since the number of people who contracted the disease continued to increase, all the patients in the hospitals were soon taken there. The city was finally completely evacuated and closed up, after the inhabitants had been assigned to definite places to live in the open fields and in a near-by forest. The plague reached its climax in the latter part of June. 'There was not a hospital,' says Petersenn,⁵ 'not a quarter of the city, not a division of troops, not a family, not a single place,

⁴ Czetyrkin, *op. cit.*, p. 4 ff.

⁵ Seidlitz, *op. cit.*, p. 187.

which had escaped infection, and everywhere one came across victims of the pestilence, some dying and some dead ; for it spared neither sex nor age nor class.' And in another place the same physician says :⁶ ' If the inside of the plague-camp afforded a terrible sight, where sick men tossed about, gasping in the burning summer heat, between the dead and dying, the conditions outside of the plague-camp were no more pleasant to witness ; for along the roads from the city to the hospitals, on fields and meadows, behind every shrub, in every ditch, dead and dying men were stretched out everywhere.' And Seidlitz, who visited Varna when the plague was at its height, asserts that the corpses were piled up ' like logs ' and carried away ' by cartloads '. According to Petersenn,⁷ the number of patients that died in the plague-hospital at Varna was :

From June 5 to 30	2,238
From July 1 to 31	1,484
From August 1 to 26	210

At the end of August there were only a few plague-patients in Varna. Of forty-one physicians, twenty-eight contracted the disease and twenty succumbed to it.

Conditions were as bad in many other places as they were in Varna ; Slobodzie, Kustendji, and Mangalia were likewise devastated. In Brailow the first cases of plague occurred in March ; in April 132 persons succumbed to the disease, in May 150, in June 774, and in July the pestilence abated.⁸

After the Russians crossed the Balkan Peninsula in the summer of 1829, Adrianople, which was reached on August 12, 1829, was free from plague, and it remained free until the end of the war. In the first part of November, however, the plague broke out there in the large old barrack which had been converted into a hospital and had become greatly overcrowded. Patients, especially persons suffering from dysentery, had been sent there from all sides, so that their

⁶ Seidlitz, *op. cit.*, p. 10.

⁸ *Ibid.*, p. 8.

⁷ *Ibid.*, p. 180.

number had increased on August 17 to 1,616, on August 27 to 3,666, and on September 1 to 4,641. On November 1, when the head-quarters were removed from there, 6,000 sick and healthy persons were left behind, the great majority of whom fell victims to the plague. According to Rinck, in the latter part of November ten or twenty soldiers suffering from plague were taken there every day, and in the middle of December not one of the 300 sick-rooms was spared; from fifty to sixty plague-patients were taken in every day at this time.⁹ In the middle of January 1830 the fury of the disease abated a little among the Russians, but it raged more and more destructively among the civil inhabitants, who numbered some 80,000. In almost all the army-divisions stationed south of the Balkans, plague broke out in the winter of 1829-30; the entire army, therefore, before returning to Russia, had to be quarantined twice for a period of twenty-one days.

Plague also revealed its presence in Transcaucasia, where fighting was likewise going on. In Armenia it had broken out shortly before the beginning of the Russo-Turkish War, as also in Erzerum. The reinforcements coming from there had brought plague to Kars, where it spread rapidly in the Turkish army.¹⁰ In June 1828, when the stronghold of Kars was stormed, the disease was borne by Turkish prisoners back to the Russian army; but the strict measures of Field-Marshal Count Paskewitsch prevented it from spreading further in the army.¹¹ But the inhabitants of Kars resisted these orders, and the result was that plague continued to rage there, partly in the garrison, which in twenty days had 530 plague-patients, and partly among the inhabitants, until September. The plague was conveyed by Turkish prisoners to Eriwan, to the region of Tiflis, and to other places. In

⁹ Seidlitz, *op. cit.*, p. 186.

¹⁰ J. D. Tholazan, *Histoire chronologique et géographique de la peste au Caucase, en Arménie et dans l'Anatolie, dans la première moitié du XIX^e siècle. Gazette médicale de Paris*, vol. xlv, p. 458. 1875.

¹¹ Cyetyrkin, *op. cit.*, pp. 6 ff.

the stronghold of Achalzich, situated midway between Batum and Tiflis, plague broke out in the year 1829; in the latter part of February the stronghold was besieged by the Turks, who were infected with plague. In consequence of a sortie of the small garrison on March 6, which resulted in the withdrawal of the Turks, since at the same time Russian reinforcements were approaching, the plague was conveyed to Achalzich, where the first cases occurred on March 10 in the garrison, and shortly afterwards among the inhabitants. On May 23 that part of the garrison which had been spared by the plague was marched out into the open country, and the stronghold was thoroughly cleansed, after which no more cases were reported. In the fall of 1829 plague completely disappeared from among the Transcaucasian troops, and from the territory under their control.

2. THE CRIMEAN WAR (1854-6)

The Crimean War plays a very conspicuous rôle in the history of war-pestilences and of military sanitation; on the one hand, it showed how severe a penalty an army has to pay if, without measures of precaution, troops are sent to the scene of the war from infected localities; on the other hand, it showed that it is possible to prevent serious outbreaks of pestilence if energetic measures are adopted to provide good food and shelter for the troops. Whereas the English soldiers suffered a great deal more from pestilence in the first winter than the French soldiers, in the second winter, in consequence of great improvements introduced in the housing, clothing, and feeding of troops, the English suffered very little, while the French suffered severely.

In the year 1853 cholera made its appearance in several places in France, and in the following year it spread over the entire country; it raged most furiously in the southern districts. Since the French troops, who were embarked at Toulon and Marseilles, were consequently infected with cholera, those suffering from the disease had to be put ashore

from the first transport ship at Malta, and others at the Peiraeus. When the troops disembarked at Gallipoli there were thirteen cholera-patients among them, and these were presently followed by other cases. Sporadic cases of cholera then began to occur wherever the French soldiers went, as in Nagara, Varna, Adrianople, &c. The fact that the disease was borne thither by French troops was frankly admitted by most of the French military physicians; only a few, for example, Cazalas, assumed that the disease was already prevalent in Dobrudja.¹²

During the expedition undertaken by the French soldiers to the unhealthy and deserted district of Dobrudja, cholera broke out in the army like an explosion, compelling it to return. The English soldiers during the siege of Varna, and also parts of the English fleet, were likewise attacked by cholera. Statements made by Scrive and Chenu regarding the number of French soldiers that succumbed to the pestilence diverge widely; according to Scrive, the French army, which numbered some 55,000 men, lost 5,183 men between July 3 and August 30, 1854, in consequence of cholera,¹³ while Chenu gives us the following statistics:¹⁴

	<i>No. patients.</i>	<i>No. deaths.</i>
July (1854) . . .	8,239	5,030
August . . .	3,043	3,015
September . . .	376	239

The English army, which numbered some 30,000 men, also suffered:¹⁵

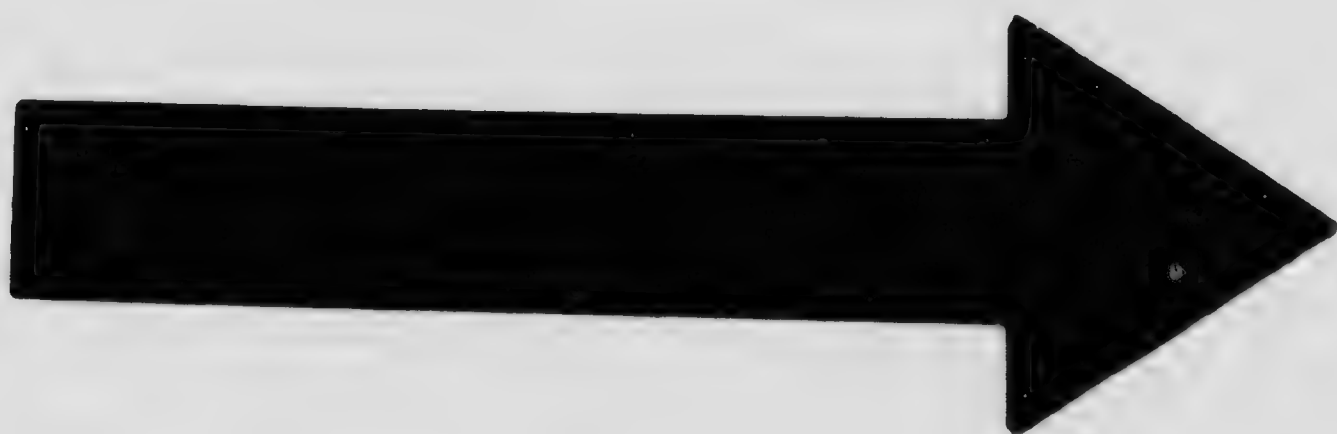
	<i>No. patients.</i>	<i>No. deaths.</i>
July (1854) . . .	449	285
August . . .	938	611
September . . .	1,232	575
October . . .	445	273

¹² G. Scrive, *Relation médico-chirurgicale de la campagne d'Orient*. Paris, 1857. Pp. 56 ff., and p. 71.

¹³ Scrive (loc. cit.), p. 343.

¹⁴ J. C. Chenu, *Rapport au Conseil de santé des armées sur les résultats du service médico-chirurgical aux ambulances de Crimée et aux hôpitaux militaires français en Turquie pendant la campagne d'Orient en 1854-5-6*. Paris, 1865. P. 565.

¹⁵ Chenu (loc. cit.), p. 598.



In September the scene of the war was transferred to the Crimea, but there again cholera raged furiously in both armies; in the winter of 1854-5, to be sure, it carried away a relatively small number of men, but in the summer of 1855 it broke out anew with great severity. The total number of deaths in the French army during the entire campaign was 12,467, in the English army 4,513, and in the Piedmontese army 1,230. The size of the armies varied greatly; the French army was largest in the latter part of the year 1855, when it numbered 145,000 men; the total number of English soldiers was 97,864, and that of Piedmontese soldiers, 21,000.

According to Häser,¹⁸ cholera spread far and wide from the scene of the war—throughout Turkey, around the Black Sea, in Greece, in Smyrna, along the coast of the Dardanelles, in Constantinople, Odessa, Rumelia, and in the Danube principalities; the inhabitants of the district of Dobrudja also suffered severely from the pestilence, which after the war spread over a large part of Russia.

Scurvy also raged in the French army in the dry summer of the year 1855, as well as in the severe winter following. In August 1855 there were 2,581 scurvy patients in the army, which was the largest number in the summer months, and in February there were 4,341, the largest number in the winter months. The outbreak of scurvy among the English troops, who also suffered from the disease in the winter of 1854-5, was later checked by the consumption of better food.

Lysentery was also very common: 6,105 French soldiers suffering from that disease in the Crimea were taken to the field-lazarets; 2,061 died there, and 2,792 were removed to Constantinople. No less than 7,883 English soldiers contracted acute and chronic dysentery, and 2,143 succumbed to it.

As early as the winter of 1854-5 a small number of cases of typhus fever occurred among the French and English soldiers; but not until the winter of 1855-6, between the

¹⁸ Häser, *op. cit.*, p. 800.

months of December and March, did the disease become very widespread in the French army in consequence of unfavourable living conditions ; the English army, on the other hand, scarcely suffered at all during that winter. Scrive and Chenu publish the following statistics relating to the French army in the field-lazarets of the Crimea :

Months.	Size of army.	Typhus fever patients.	Taken to Constantinople.	No. deaths.
December (1855)	145,120	734	204	323
January (1856)	144,512	1,523	320	464
February	132,800	3,402	925	1,435
March	121,000	3,457	1,140	1,830
April	105,000	237	—	101
May	67,000	38	—	17

According to Scrive, 11,124 typhus-fever patients, all told, were taken into the field-lazarets of the Crimea between September 1854 and July 1856 ; of these, 3,840 were removed to Constantinople, and 6,018 died in the field-lazarets.¹⁷ But Scrive says that this number of typhus-fever patients is too small ; it must have been increased by the number of persons who contracted the disease in the field-lazarets and hospitals, 4,502 of whom succumbed to it, and the number who contracted and succumbed to it in Constantinople and France, making 7,000 all told. According to Scrive, therefore, the total number of deaths due to typhus fever in the French army was no less than 17,515, from which he assumes that at least 35,000 men contracted the disease.¹⁸

In the English army typhus fever appeared only sporadically in the winter of 1855-6 ; according to Chenu, 167 men contracted the disease and 62 succumbed to it.¹⁹

Among the Russian troops typhus fever raged furiously,²⁰ and according to A. Hirsch it was also very widespread in southern Russia.²¹

¹⁷ Scrive, op. cit., p. 345.

¹⁸ Ibid., p. 420.

¹⁹ Chenu (note 14, Chapter VII), p. 595.

²⁰ O. Niedner, *Die Kriegsepidemien des 19. Jahrhunderts und ihre Bekämpfung*. Berlin, 1903. P. 64.

²¹ A. Hirsch, op. cit., vol. i, p. 395.

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In Constantinople, typhus fever, although it infected numerous persons in the military hospitals, apparently did not spread to the civil population. Baudens, who after the capture of Sebastopol came to the Orient, says expressly that the inhabitants of Constantinople were spared by the epidemic during its entire course.²¹

According to Murchison, typhus fever was borne by English troops to English soil, where in the years 1856-7 it caused epidemics in various parts of the country. The following table indicates the number of typhus-fever patients taken into the Fever Hospital in London :

1854	.	.	.	.	.	.	337
1855	.	.	.	.	.	.	342
1856	.	.	.	.	.	.	1,062
1857	.	.	.	.	.	.	274
1858	.	.	.	.	.	.	15

The increased number in London was not due to the fact that the disease was brought over from Ireland, since there were only fifty-three Irishmen among the patients, and only two of them had been in the city less than three months. On the other hand, the warlike events caused a famine, resulting in much misery among the poor, and this favoured the further dissemination of the disease.²²

When the French troops were transported back to France, energetic and extensive measures of precaution were adopted ; only those troops were allowed to embark who had for several weeks been entirely recovered from typhus fever ; several stations for the discharge of men who contracted the disease on the way were located along the coast of the Mediterranean Sea, and sixty-two patients, all told, were left behind at them ; suspected divisions of troops, before disembarking at Marseilles, were quarantined for a time on several islands along the coast, on St. Marguerite (Îles de Lérins), on the

²¹ M. L. Baudens, *La guerre de Crimée, les campements, les abris, les ambulances*, etc. Paris, 1858. Taken from the second edition, translated by W. Mencke. Kiel, 1864. P. 164.

²² Ch. Murchison, *Die typhoiden Krankheiten*. Quoted from the German translation by W. Zülzer. Brunswick, 1867. P. 43.

Îles d'Hyères, and on others, and before entering the city they were examined again, bathed, and re clothed. The result was successful. Laveran says: ²⁴ 'The further one went away from the seat of the infection, and the more the soldiers scattered, the more the miasm seemed to lose strength; in France the typhus-fever patients gave rise to only a few cases inside the hospitals where they were being cared for; the disease was never communicated to the civil population.'

Sporadic cases were observed in Marseilles, Toulon, Avignon, Chalon-sur-Saône, and in other places. A small lazaret-epidemic also occurred in Paris in the Val-de-Grâce; according to Godelier, ²⁵ almost all the patients there belonged to the Fiftieth Regiment, which on November 30, 1855, embarked at Kamiesch. The condition of health in the regiment at that time was good, and, in particular, it was free of typhus fever. Of the two ships on which the soldiers were transported, the one took only thirty days to get from Kamiesch to Marseilles and had no cases of typhus fever, while the other, which had a harder voyage, took fifty days and had numerous cases of typhus fever on the way; fifteen patients were put into the hospital at Malta and twenty-five in that at Marseilles. No less than fifty-eight soldiers in this regiment contracted the disease in the Val-de-Grâce, and they infected five nurses; eight soldiers and one nurse fell victims to the disease.

3. THE NORTH AMERICAN CIVIL WAR (1861-5)

At the outbreak of the Civil War almost nothing was done in the two armies to prevent the outbreak and dissemination of diseases; the assembling of so many troops rendered severe pestilences inevitable. The successful activity of numerous voluntary societies did a great deal of good in the

²⁴ A. Laveran, *Traité des maladies et épidémies des armées*. Paris, 1875. P. 257.

²⁵ Godelier, *Mémoire sur le typhus observé au Val-de-Grâce du mois de janvier au mois de mai 1856*. *Gazette méd. de Paris*, 1856. Nos. 40-1. Quoted from Laveran (loc. cit), p. 257.

way of improved methods of sanitation; the centre from which this activity emanated was an officially recognized Sanitary Commission, founded on June 15, 1861, which made the prevention of pestilences its principal function. It was enabled to carry on its work by large voluntary contributions of money. The means which the Commission employed were: good equipment, food, and shelter for the men, isolation of men suffering from infectious diseases, burning of the clothes, beds, and tents used by these patients, erection of clean, well-ventilated barrack-lazarets, and comprehensive plans for transferring invalid soldiers from the field-hospitals.²⁶

Since upwards of a million men, counting both sides, were gradually brought face to face with one another, the loss of human life was necessarily terrible. Regarding the losses sustained by the Northern States, we are excellently informed by an exhaustive health-report in six volumes, issued by the United States.²⁷ The report also contains some statistics regarding the prevalence of disease among the Confederates and regarding the prisoners, but no figures relating to the losses sustained by the Southern States are available.

Regarding the total loss of troops sustained by the Northern States, we find the following compilation: ²⁸

<i>Cause of death.</i>	<i>White troops.</i>	<i>Coloured troops.</i>	<i>Total.</i>
Killed in battle . . .	42,724	1,514	44,238
Died from wounds, &c. .	47,445	1,760	49,205
Suicide, murder, execution .	469	57	526
Diseases	157,004	29,212	186,216
Unknown causes . . .	23,347	837	24,184
Total	270,989	33,380	304,369

²⁶ H. von Haurowitz, *Das Militärsanitätswesen der Vereinigten Staaten von Nordamerika während des letzten K.riegs.* Stuttgart, 1866.

²⁷ *The medical and surgical history of the war of the rebellion (1861-5), prepared in accordance with acts of congress under the direction of Surgeon-General Joseph K. Barnes, United States Army, Washington.* Six vols., 1870-88. The work is divided into two main parts, each consisting of three volumes. Part I includes the Medical History; Vol. I gives the statistical results, Vols. II and III deal with the individual diseases (Vol. II only with diarrhoea and dysentery). Part II, Vols. I-III, comprises the Surgical History.

²⁸ Ibid. Part I, p. xxxvii, and vol. iii, p. 1.

If we divide the deaths of unknown cause proportionally among the other groups, the total number of deaths among the white troops due to diseases was 171,806, and among the coloured troops 29,963.

In the statistical table in the first volume of the *Medical History* the figures relating to the number of deaths are not complete; the total numbers given there are:

	White troops.	Coloured troops.
Wounds, &c.	36,688	1,427
Suicide, murder, execution	549	78
Diseases	128,937	27,499
Uncertain	449	?
Total	166,623	29,004

Typhoid fever demanded the largest number of victims; in the first two years of the war it appeared in the form of murderous epidemics in the Northern army, mostly in the Atlantic and central districts, and less severely in the region of the great ocean. If the common continued fevers, the typho-malarial fevers, and typhus fever, are combined with the typhoid fevers and looked upon as typhoid fever, there died from this cause in the Northern army during the entire war 32,112 white troops and 3,689 coloured troops. In considering these figures, we must remember that, as stated above, they are incomplete. On this basis, out of every 1,000 men there succumbed to typhoid fever:²⁰

	White troops.	Coloured troops.
1861-2	20.75	—
1862-3	18.24	—
1863-4	8.52	28.50
1864-5	11.45	19.31
1865-6	8.98	11.60
Average	13.58	19.8

As in the case of typhoid fever, so also in the case of other diseases, the coloured troops suffered the heaviest losses, probably because the food and shelter they received were not so good, and perhaps also because they had less under-

²⁰ *Medical and Surgical History*, part iii, p. 193. The reports for each year begin on July 1.

standing of the sanitary measures that were ordered. Among the Confederate prisoners that were brought north, about 40,875 in number, 18·4 out of every 1,000 succumbed to typhoid fever.³⁰

Regarding the appearance of typhus fever in the American Civil War, views diverge. Since only a relatively small number of cases of that disease are recorded, it is probable that those cases were wrongly diagnosed, since typhus fever is so highly contagious. In the health-reports of the Northern States, in which the word typhus, as in England and France, means typhus fever, we find the following figures relating to the disease :

	No. that contracted it.	No. that succumbed to it.
White troops	2,501	850
Coloured troops	123	108

But there are very few case-histories and absolutely no post-mortem reports available from which one can draw a positive conclusion. Laveran doubts the occurrence of typhus fever.³¹ According to Niedner, on the other hand, typhus fever prevailed among the Northern prisoners in the terribly neglected prisons of Salisbury, North Carolina, and probably, too, in other places.³² It is to be surmised that the increased number of typhus fever patients in New York and Philadelphia, &c., which Hirsch adduces in accordance with the statements of da Costa and Corse, was connected with the epidemic among the prisoners.³³ According to Corse, the number of deaths due to typhus fever in Philadelphia was 37 in the year 1862, 131 in 1863, and 335 in 1864.

Unusually prevalent were diarrhoea and dysentery, so that, notwithstanding their relatively mild character, they caused a large number of deaths. The cases of cholera reported were not Asiatic cholera, but a local form of the disease. In the Northern army the following figures indicate

³⁰ *Medical and Surgical History*, part iii, p. 209.

³¹ Laveran, *op. cit.*, p. 258.

³² Niedner, *op. cit.*, p. 72.—Also *Medical and Surgical History*, part iii, p. 323 ff.

³³ Hirsch, *op. cit.*, p. 404.

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the number of deaths due to acute and chronic dysentery and diarrhoea :

	WHITE TROOPS.				COLOURED TROOPS.			
	Dysentery.		Diarrhoea.		Dysentery.		Diarrhoea.	
	Acute.	Chronic.	Acute.	Chronic.	Acute.	Chronic.	Acute.	Chronic.
June 1861	3	1	—	—	—	—	—	—
1861-2 .	338	136	230	501	—	—	—	—
1862-3 .	967	1,090	941	7,556	—	—	—	—
1863-4 .	1,242	931	620	7,868	496	220	503	784
1864-5 .	1,248	919	973	10,600	584	255	608	1,788
1865-6 .	286	152	159	1,033	412	151	257	706
1861-6 .	4,084	3,229	2,923	27,558	1,492	626	1,368	3,278

Out of every 1,000 men there succumbed to dysentery and diarrhoea together : ³⁴

	White troops.	Coloured troops.
1861-2	4·17	—
1862-3	15·99	—
1863-4	15·78	43·54
1864-5	21·29	36·29
1865-6	16·00	26·97

Small-pox raged very extensively during the American Civil War; the coloured troops manifested much more susceptibility to it than the white. The dissemination of the disease was helped along by the fact that vaccination, which had been neglected on account of the hasty mobilization, could not be attended to as rapidly as was desirable.

Measles also broke out in both armies in the form of widespread epidemics. All told, 67,763 white troops and 8,553 coloured troops contracted the disease, while 4,246 of the former and 931 of the latter succumbed to it. Out of every 1,000 men there succumbed : ³⁵

	SMALL-POX.		MEASLES.	
	White troops.	Coloured troops.	White troops.	Coloured troops.
1861-2 .	1·36	—	1·97	—
1862-3 .	1·45	—	1·99	—
1863-4 .	3·21	16·52	1·88	12·35
1864-5 .	1·75	8·69	1·68	3·75
1865-6 .	0·69	14·24	0·11	0·51

³⁴ *Medical and Surgical History*, part ii, p. 67.

³⁵ *Ibid.*, part iii, p. 624.

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Malaria became particularly widespread; on an average no less than 52 per cent of the white troops and 83 per cent of the coloured troops contracted the disease per annum. It is absurd to say, then, that the negroes are immune to the disease; on the contrary, they contracted it much more frequently and suffered a great deal more severely from it than the whites. The troops in the military districts of Carolina and Arkansas, and also along the great rivers—the Mississippi, Ohio, and Potomac—were attacked by it with particular severity. Out of every thousand men the number that contracted the disease and the number that succumbed to it is shown by the following table: ³⁶

WHITE TROOPS.		COLOURED TROOPS.	
No. patients.	No. deaths.	No. patients.	No. deaths.
1861-2 . 404.0	2.77	—	—
1862-3 . 460.1	3.76	—	—
1863-4 . 584.1	3.19	833.7	15.19
1864-5 . 558.4	3.34	750.0	8.77
1865-6 . 853.1	5.42	947.0	7.81

The total loss sustained by the Northern army in consequence of the most important infectious diseases is indicated by the following table: ³⁷

		WHITE TROOPS.					
		Typhoid fever.	Typhus fever.	Dysentery, diarrhoea.	Small-pox.	Measles.	Malaria.
No. troops.							
1861 May-June 41,556		17	3	4	—	1	3
1861-2 . 288,919		5,795	201	1,205	34	393	568
1862-3 . 659,955		11,658	378	10,554	96	950	1,314
1863-4 . 675,413		5,632	123	10,661	56	2,171	1,268
1864-5 . 645,506		7,266	124	13,740	67	1,131	1,082
1865-6 . 101,897		894	21	1,630	22	71	11
Annual Average 468,275	Totals	31,262	850	37,794	275	4,717	4,246
							8,140
		COLOURED TROOPS.					
1863-4 . 45,174		1,251	60	2,003	7	760	568
1864-5 . 89,143		1,680	41	3,235	10	775	334
1865-6 . 56,617		650	7	1,526	13	806	29
Annual Average 63,645	Totals	3,581	108	6,764	30	2,341	931
							1,923

³⁶ *Medical and Surgical History*, part iii, pp. 82-3.

³⁷ For the white troops, *ibid.*, part i, pp. 636-7; for the coloured troops, part i, p. 710.

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In the prisons the mortality on both sides was terrible. Regarding the conditions among the Confederate prisoners that were interned in the Northern States we are informed by the following table. The average number of men in the prisons was 40,815, and of this number 19,060, all told, died; taking the entire war into account, this gives a mortality of 230.7 per 1,000 per annum.²⁸ The figures are divided among the various diseases as follows:

	<i>Deaths (all told).</i>	<i>Annual rate per 1,000.</i>
Typhoid Fever, Typhus Fever	1,109	13.6
Malaria	1,026	12.6
Small-pox, Measles, Scarlet Fever, Erysipelas	3,453	42.3
Diarrhoea, Dysentery	5,965	73.0
Scurvy	351	4.3
Bronchitis	133	1.6
Inflammation of the Lungs and Pleurisy	5,042	61.7
Other diseases	1,729	21.3
Wounds and uncertain maladies	252	0.3
Total	19,060	230.7

The conditions among the Northern prisoners confined in the Southern prisons were still worse. In the Andersonville prison, where in the six months between March 1 and August 31, 1864, an average of 19,453 prisoners were confined, 7,712 died; this means an annual rate of 792.8 per 1,000 men. The following table indicates the proportional mortality of the individual diseases:²⁹

<i>Cause of death.</i>	<i>Deaths (all told).</i>	<i>Annual rate per 1,000.</i>
Typhoid Fever, Typhus Fever	199	20.5
Malaria	119	12.2
Small-pox, Measles, Scarlet Fever, Erysipelas	80	8.2
Diarrhoea, Dysentery	4,529	465.6
Scurvy	999	102.8
Bronchitis	90	9.2
Inflammation of the Lungs and Pleurisy	266	27.4
Other diseases	844	86.7
Wounds and uncertain maladies	586	60.2
Total	7,712	792.8

²⁸ *Medical and Surgical History*, part iii, p. 47.

²⁹ *Ibid.*, part iii, p. 35.

Malaria.

1
800
2,480
2,152
2,155
552
8,140

699
782
442
1,923

i, p. 710.

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Since mortality statistics existed in only a few of the Northern States at that time, and the deaths for the year in question were included merely incidentally in the census taken every ten years, it is impossible to adduce any figures relating to the spreading of infectious diseases from the army to the civil population. But certain it is that this happened to a great extent in the regions where the fighting took place. In the case of two States, Massachusetts and Connecticut, mortality statistics are available; in both we find an increased death-rate during the Civil War. The figures, which do not include the still-births, are as follows :

<i>Year.</i>	<i>Connecticut.</i>	<i>Massachusetts.</i>
1860	16.3	18.7
1861	16.5	19.5
1862	18.0	18.5
1863	18.0	22.1
1864	19.0	22.8
1865	16.0	20.6
1866	15.0	18.1
1867	14.3	17.0

In the case of Massachusetts, moreover, we have statistics relating to the cause of death; these statistics show a considerable increase in deaths due to typhoid fever, small-pox, and dysentery; the mortality of scarlet fever was also very high there during the war-years, but this fact was in no way connected with the war. The number of people who contracted the above-mentioned diseases in Massachusetts was: ⁴⁰

<i>Year.</i>	<i>Typhoid Fever.</i>	<i>Small-pox.</i>	<i>Dysentery.</i>
1860	937	334	441
1861	989	33	532
1862	1,135	40	479
1863	1,442	42	1,156
1864	1,344	242	1,186
1865	1,694	221	1,548
1866	1,091	141	949
1867	965	196	658

⁴⁰ L. March, *Statistique internationale du mouvement de la population*. Paris, 1907. P. 867.

4. THE ITALIAN WAR OF 1859⁴¹

The Italian War of 1859, which the French and Piedmontese together waged against Austria in Upper Italy, was not attended by any severe pestilences, probably because it was terminated in a comparatively short time, and the number of troops engaged was not very large. To be sure, typhoid fever and dysentery carried away many men on both sides, while an unusually large number of soldiers contracted malaria. Those fevers which were called 'Fièvres rémittentes épidémiques d'Italie', and which, notwithstanding their frequent occurrence, caused only a few deaths, according to Niedner were for the most part malaria, and not relapsing fever. The Austrian army seems to have lost more men in consequence of pestilences than the French army. Regarding the spreading of the pestilences on a large scale from the armies to the civil population we have no information.

5. THE DANISH WAR OF 1864

In the war of 1864, which Austria and Prussia waged against Denmark, no epidemics of wide extent occurred. 'The small number of men engaged,' says Knaak,⁴² 'the not particularly unfavourable external conditions, the constant communication between the fighting armies and their home-countries, and the non-appearance of large epidemics, all helped to render the health-conditions of the war favourable.' The total loss sustained by the Prussian army, which reached a maximum size of 63,500 men, amounted to 1,048 men; of these 738 died in battle, in consequence of wounds, &c., 310 succumbed to diseases, 193 of the latter to typhoid fever. Statements regarding the number of deaths in the Austrian army, which amounted to 25,000 men, are

⁴¹ M. Cazalas, *Maladies de l'armée d'Italie ou documents pour servir à l'histoire méd.-chirurg. de l'armée d'Italie*. Paris, 1864.—J. C. Chenu, *Statistique médico-chirurgicale de la campagne d'Italie en 1859 et 1860*. Paris, 1869.—P. Myrdacz, *Sanitätsgeschichte des Feldzugs 1859 in Italien*. Vienna, 1896.—O. Niedner, op. cit., pp. 66 and 118.

⁴² Knaak, op. cit., p. 31.

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not available. The Danish army, which numbered 54,000 men, lost 1,446 in consequence of wounds, &c., and 820 in consequence of diseases.⁴³

6. THE GERMAN WAR OF 1866

As regards sanitation the German War of 1866 acquired importance through the appearance of cholera on the scene of the fighting. None of the other infectious diseases developed very extensively during this war; of the Prussian army, which numbered some 280,000 men, only 379, all told, succumbed to typhoid fever, and dysentery did not appear at all. A rather mild epidemic of small-pox spread throughout a considerable part of Germany in the year 1865, and lasted until the year 1866; whether or not the war helped the disease to spread, which is not unlikely, we cannot state with certainty owing to a lack of bases of comparison. The German troops were well vaccinated, and the number who contracted the disease was no larger during the war than in times of peace. It is undoubtedly true, however, that the war exerted an unwholesome influence upon the dissemination of cholera throughout Germany and Austria.⁴⁴ Cholera had revealed its presence in Germany for the first time in the year 1865; it broke out in Altenburg, during its fourth passage through Europe, having been borne thither from Odessa. In the course of the year it broke out, in a comparatively mild form, in many places in Saxony. In the year 1866 it raged very extensively and furiously in the Rhine province and in Westphalia, whither it was borne from Luxemburg; in May cases of the disease occurred in several seaport towns of Pomerania (Swinemünde, Stettin, Cammin, &c.), and in June it broke out in Hamburg, Berlin, Posen, Silesia, East and West Prussia, and in the kingdom of Saxony.⁴⁵ Thus it came about that some of the troops enlisted came from

⁴³ Kübler, *Kriegssanitätsstatistik*. *Klin. Jahrb.*, vol. ix, p. 301. Jena, 1902.

⁴⁴ Niedner, *op. cit.*, p. 17.

⁴⁵ Hirsch, *op. cit.*, vol. i, p. 295.

infected parts of Silesia and Saxony, and the result was that individual cases of cholera began to occur in the Prussian army.

The disease was conveyed by soldiers from Stettin to Leipzig, where it spread to the civil population; from Leipzig it spread throughout Saxony and Thuringia. When the Prussian army advanced into Bohemia the cases of the disease began to increase, and after the battle of Königgrätz (July 3, 1866) the dissemination of the disease was helped along by the crowding together of large numbers of sick and wounded soldiers. The rapid advance of the Prussian army increased the disease's rate of dissemination; on all the army's lines of march large numbers of sick soldiers were left behind, for example, in Göritz, Gitschin, Königinhof, Pardubitz, Czaslau, and Leitomischl. In Prague cases of cholera were reported a few days after the city was occupied. The pestilence was conveyed by Prussian soldiers to Moravia, where it appeared in Prerau, Brünn, Iglau, Klosterbrück, Znaim, and Nikolsburg. The further advance of the Prussians conveyed it to Lower Austria; in Vienna it did not break out until August.

Some think that the pestilence was conveyed into Austria from Bukowina, where it had broken out in May 1866. When the war broke out, it is maintained, the disease was conveyed by troops to the western crown-lands of Austria.⁴⁶ 'The truth', says Niedner, 'probably lies half way between; the epidemic in Bohemia was disseminated chiefly by the Prussian troops, but in the other Austrian countries by Austrian troops.' Daimer,⁴⁷ one of the best authorities on the history of pestilences in Austria, says: 'In the year 1866 an epidemic of cholera came to an end in Bukowina, where it was looked upon as the continuation of one that had been prevailing in Turkey and Roumania; it spread

⁴⁶ A. Weichselbaum, *Epidemiologie*. Jena, 1899. P. 399. (In Th. Weyl's *Handbuch der Hygiene*, vol. ix, p. 8.)—Hirsch, *op. cit.*, vol. i, p. 294.

⁴⁷ J. Daimer, *Todesursachen in Oesterreich während der Jahre 1873-1900*. Das österreichische Sanitätswesen, 1902. Supplement to No. 37, p. 150.

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throughout the countries in which fighting was going on at that time, and was borne by troops to remote regions.' According to Presl,⁴⁸ the number of deaths due to cholera in the several crown-lands in the year 1866 was :

	<i>No. inhabitants (Dec. 31, 1869).</i>	<i>Deaths due to cholera.</i>
Lower Austria . . .	1,983,149	15,114
Upper Austria . . .	733,241	153
Salzburg . . .	152,141	1
Styria . . .	1,139,205	260
Carinthia . . .	336,768	40
Carniola . . .	465,463	930
Küstenland . . .	585,467	1,067
Tirol and Vorarlberg . . .	880,985	25
Bohemia . . .	5,151,332	42,730
Moravia . . .	2,016,186	55,527
Silesia . . .	518,443	2,919
Galicia . . .	5,491,675	34,857
Bukowina . . .	522,481	11,656
Dalmatia . . .	445,201	13
All Austria . . .	20,421,737	165,292

In Prussia, too, cholera spread, in consequence of the war, more widely than ever before; the total number of deaths caused by it in the year 1866 was no less than 114,776, and in the following year it was 6,086.⁴⁹ Of the Prussian troops 4,529 (16·2 per cent) succumbed to cholera, and the total loss due to disease was 5,219; only 4,008 men were killed on the field or died from wounds.

In the Grand Duchy of Hesse a few rather small epidemics occurred, and a larger one in Mayence.

In the case of Baden the connexion between the appearance of cholera and the war has been carefully investigated.⁵⁰ The disease broke out in the region of the Main and Tauber and in the Odenwald, and in regions which had never before been attacked by cholera. On July 24, 1866, Wertheim

⁴⁸ Fr. C. Presl, *Die öffentliche Gesundheitspflege in Österreich seit dem Jahre 1848. Statist. Monatsschrift.* 1898. Vol. iii, p. 392.

⁴⁹ Guttstadt, *Die Choleraepidemien in früherer Zeit. Hyg. Rundschau.* 1906. Vol. xvi, p. 265.

⁵⁰ Robert Volz, *Die Cholera auf dem Badischen Kriegsschauplatz im Sommer 1866. Amtlicher Bericht.* Karlsruhe, 1867.

received a Prussian garrison, which on the 26th was joined by parts of the Hamburg contingent. As mentioned above, cholera had already broken out in Hamburg in June, and a few days after the arrival of the Hanseatic troops some of them contracted the disease and were taken, despite the objections of the local authorities, to the town hospital. On August 6, cases of the disease appeared in the city, and they constituted the beginning of a small epidemic which lasted six weeks. On September 22 the epidemic was over, after the population of 3,383 had lost 28 persons by death; 64 persons contracted the disease. In near-by Freudenberg, of 42 people that contracted the disease, 23 died. In Schönfeld two soldiers of the Hamburg contingent contracted the disease on July 29; the first case among the civil inhabitants, who numbered 524, was on August 2, and in a few days a small epidemic began; 166 people contracted the disease and 55 succumbed to it. At the same time the Hanseatic troops conveyed the disease to Gerlachsheim, where 61 persons contracted it and 32 died of it, and also to Ilmspan, where 97 contracted it and 34 succumbed to it. On August 1 the Hamburg soldiers came to Grünsfeld and brought four cholera patients with them, and the result was that 177 of the inhabitants, who numbered 1,458 all told, contracted the disease and 23 of them died. The disease was conveyed to Dittigheim by cholera convalescents of the Hamburg contingent, and 225 persons contracted it there and 66 succumbed to it. In Gerlachsheim it appeared after a Saxon ammunition-column, which was supposed to be absolutely free from the disease, had passed through the city. In the case of Walldurn, which had a very severe epidemic (the city had 3,339 inhabitants, and of these 827 contracted the disease and 113 succumbed to it), it was impossible to prove that the disease broke out in consequence of the arrival of the soldiers. Kilsheim, which was infected from Walldurn, had only a small number of cases. Throughout Baden 1,774 persons contracted cholera and 404 succumbed to it. From

these statements it is very evident that the danger of an extensive epidemic of cholera in the regions south of the Main would have been very great, if the war had been carried on there on a large scale, and had thus prevented the authorities from taking measures to prevent the dissemination of the disease.

The small epidemic in Uzmemmingen, a village of 700 inhabitants in the north-east part of Württemberg, was brought about by a chamber-maid, who on August 25 brought the disease from a Bohemian place through which a Prussian detachment had passed; 60 persons, all told, contracted the disease in Uzmemmingen, and 19 succumbed to it.⁵¹

In the Bavarian Governmental District of Lower Franconia cholera broke out, as in Baden, in consequence of the operations of Prussian troops.⁵² In the last week of July there were skirmishes between the Prussians and Bavarians near Hettstadt and Waldbrunn; after the withdrawal of the Prussians, many of whom were seized with diarrhoea, cholera broke out in both of those villages. The outbreak in Miltenberg was also connected with the arrival there of Prussian soldiers. Presently other places in Lower Franconia were attacked; for example, Rothenfels, Birkenfeld, Karbach, Stadtprozelten, Tiefenthal, Waldbüttelbrunn, &c. A Bavarian authority gives credit for the non-appearance of the disease in Remlingen and among the civil inhabitants of Uettingen, where Prussian soldiers suffering from cholera lay, to the care and vigilance of the Prussian military physicians. Cholera also appeared in the Governmental District of Swabia, breaking out in the cities along the Danube, in Höchstädt, Dillingen, Gundelfingen, and Neuburg. But it was impossible to prove that the disease was conveyed thither from the scene of the war.⁵³

⁵¹ J. Teuffel, *Die Choleraepidemie zu Uzmemmingen, O.-A. Neresheim, im Jahre 1866*. Württ. med. Corr.-Bl. 1867. P. 129 ff.

⁵² *Die Cholera in Unterfranken während des laufenden Sommers*. Bayr. ärztl. Intel.-Blatt 1866, p. 509.

⁵³ A. Martin, *Die Cholera in Bayern während des diesjährigen Sommers*. Bayr. ärztl. Intel.-Blatt, 1866, p. 577.

CHAPTER VIII

THE FRANCO-GERMAN WAR OF 1870-1, AND THE EPIDEMIC OF SMALL-POX IN THE EUROPEAN STATES CAUSED BY IT

I. SIZE OF THE ARMIES

IN the Franco-German War of 1870-1 a larger number of troops were assembled within a short time upon the field of battle than in any previous campaign. On the German side 33,101 officers and 1,113,254 men took part in the war - the average number of men in the German field-army was 815,000. The total number of French soldiers under arms is not definitely known; that it was enormous is evident from the fact that the number of prisoners taken (including the garrison in Paris and General Bourbaki's army) amounted to no less than 21,500 officers and 702,000 men. At certain periods of the war huge bodies of troops were congregated within comparatively narrow limits; at the battle of Gravelotte (August 18, 1870) some 180,000 to 200,000 men faced one another on either side; at the siege of Metz the average size of the German investing army was 240,000 men, while the French army in the city numbered 173,000 men at the time of the capitulation. At the battle of Sedan (September 1, 1870) 124,000 French soldiers were opposed to nearly twice that number of Germans. The garrison in Paris amounted to about 250,000 men, while the German besiegers averaged 240,000 men.

II. DYSENTERY, TYPHOID FEVER, AND TYPHUS FEVER

Despite the fact that these enormous congregations of men were often exposed to very unfavourable weather conditions, and were much of the time scantily fed, the number of German field-troops that contracted and succumbed

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to infectious diseases was comparatively small. The total loss sustained by the German army in consequence of injuries and diseases amounted to 43,182 men, and of these 14,648 died of disease. The following table indicates the percentage of deaths caused by the various diseases :

<i>Disease.</i>	<i>Per cent.</i>
Typhoid Fever	60.0
Dysentery	16.2
Small-pox	1.9
Intermittent Fever	0.1
Other infectious diseases	0.3
Other diseases	21.5

Typhoid fever and dysentery were most prevalent, for the reason that the troops were often quartered in places where these diseases were already endemic. Regarding these matters we are accurately informed by the 'Health Report relating to the German Armies in the War of 1870-1 against France', an exhaustive account published by the Medical Division of the Prussian War Department.¹

A total of 74,205 men in the German field-army contracted typhoid and gastric fever, and 8,904 succumbed to them. The eastern Departments of France, especially the city and vicinity of Metz, were constantly afflicted with typhoid fever. This explains why both the German besiegers and the French defenders suffered so severely from that disease, the dissemination of which was helped by the contamination of the springs and water-courses, partly through excessive use, and partly in consequence of the burial of dead men and horses in close proximity to them. And while drinking-water was for that reason brought from a distance, the water used for other purposes was obtained in the immediate neighbourhood. It is obvious that typhoid fever must have raged extensively among the inhabitants of the villages

¹ Most of the statements in this chapter are taken from vols. ii and vi of the *Sanitätsbericht über das deutsche Heer im Krieg gegen Frankreich 1870-1*. Berlin, 1886.—Compare also H. Westergaard, op. cit., p. 228.

surrounding Metz, the mortality in which during the siege was three times as high as normal. This is evident from a compilation of figures in the German Health Report,² indicating how the death-rate in these villages rapidly decreased after the withdrawal of the Germans; per 100 inhabitants, there died in:

	<i>Inhabitants.</i>	<i>Nov.</i>	<i>Dec.</i>	<i>Jan.</i>	<i>Feb.</i>	<i>March.</i>
Verneville .	672	2.39	1.34	1.04	0.30	0.74
St. Privat .	480	2.70	1.20	1.68	0.84	0.42
Gravelotte .	708	2.14	0.71	0.55	0.71	—
Ste. Marie aux						
Chênes .	340	1.17	0.59	0.59	0.29	0.59
Rezonville .	587	1.87	0.87	0.68	0.68	0.85
Gorze .	1,774	1.45	0.73	0.56	0.22	0.39

Typhoid fever and dysentery were chiefly responsible for this high mortality. As at Metz, so also at Sedan and Paris, the troops suffered severely from typhoid fever.

Large numbers of typhoid-fever patients were taken to lazarets in Germany; the Prussian lazarets alone took in 30,507, of whom 1,376 died.

Typhoid fever raged furiously among the French prisoners of war, who usually brought the germ of the disease with them from the scene of the hostilities. 'Most observers', we read in the German Health Report,³ 'agree that the disease was most prevalent during the first three weeks after the arrival of large transports of prisoners at their place of detention; after that it gradually abated, and finally appeared only sporadically.' The military prisons, however, while they often formed new sources of infection, did not help to disseminate the disease, owing to the advanced season of the year.

It made considerable difference from what part of the scene of the war the prisoners came; those coming from Strassburg and Toul were much less severely infected with typhoid fever than those from Sedan and Metz. This applies particularly to General Bourbaki's men, who manifested the

² Vol. vi, p. 162.

³ Vol. ii, p. 199.

least power of resistance to the disease. In Rastatt; for example, there were at one time sixty prisoners suffering from typhoid fever; of those who had come from Strassburg, Neubreisach, and Schlettstadt 13·3 per cent died; of those from Metz 14·5 per cent died, and of those from Bourbaki's army 40·6 per cent died. Of the French prisoners confined in Germany (the maximum number was 374,995 and the average number 262,496) 15,020 contracted typhoid fever and 3,835 succumbed to it. The prevalence of the disease among the German troops, as compared with its prevalence among the French prisoners, is indicated by the following table:

	<i>No. per 1,000 that succumbed to typhoid fever.</i>	<i>No. that died per 100 treated.</i>
Mobile German army . . .	11·2	12·0
Immobile " " ⁴ . . .	3·0	4·1
French prisoners . . .	14·6	25·6

The immediate vicinity of the places in which all these French prisoners suffering from typhoid fever were confined was necessarily unsafe to live in; and while the epidemics that were brought about by people contracting the disease there and conveying it abroad were always kept localized, they were by no means confined to the very narrow limits indicated, on the basis of scattered communications, in the German Health Report. The reason for this moderate dissemination is clear; at that time typhoid fever was rendered much less prevalent throughout Germany by the introduction of extensive sanitary measures (sewers, aqueducts, refuse removal, &c.), which prevented the disease from constantly spreading from place to place. In Frankfurt-on-the-Main the mortality due to typhoid fever was not increased; the number of deaths per 10,000 inhabitants was:

⁴ Including the convalescent German troops from France that were taken into the immobile army-corps.

1867	.	.	.	.	.	.	4.3
1868	.	.	.	.	.	.	7.1
1869	.	.	.	.	.	.	4.2
1870	.	.	.	.	.	.	5.8
1871	.	.	.	.	.	.	5.8
1872	.	.	.	.	.	.	6.1

In many cities, on the other hand, an increased number of deaths due to typhoid fever was observed; whether this was attributable to a transplantation of it from France, or to a spontaneous outbreak of it among the many people in these cities who already had the germ in their systems, it is impossible to ascertain. From the statistics we are scarcely ever able to make out the proportion of soldiers and civilians that died. The number of deaths due to typhoid fever per 10,000 inhabitants was:

	<i>Berlin.</i>	<i>Munich.*</i>	<i>Elberfeld.</i>	<i>Strassburg.</i>	<i>Erfurt.</i>	<i>Plauen.</i>
1867	6.9	6.0	8.1	8.5	10.6	2.4
1868	10.0	8.0	5.3	9.0	9.4	3.3
1869	6.7	13.0	5.3	9.6	—	6.7
1870	7.8	14.0	9.3	17.8	—	21.8
1871	8.9	14.0	9.4	14.2	33.1	2.5
1872	13.9	24.0	8.8	7.8	5.3	4.9

In the case of Strassburg the increase caused by the war is clear; of the civil inhabitants alone, 74 died in the year 1869, 137 in the year 1870, and 110 in the year 1871. In the case of Elberfeld the increase began in the year 1870. In Munich the increase began as early as the year 1869, although the very high mortality did not commence until 1872, as in Berlin; in these two cases the increase cannot be said to have been caused by the war. The same is true of Plauen, where the increase also began in 1869. In the case of Erfurt, unfortunately no statistics are available for the year 1870; in the year 1871 the increase there is very marked. To be sure, it is not expressly stated that prisoners of war are excluded, but as they were not included in the total mortality, or in that due to small-pox, we may

* Prior to 1870 the reports cover the year beginning October 1 and ending September 30.

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safely assume that they were excluded in the case of typhoid fever.⁶

A marked increase in the prevalence of typhoid fever is to be noted in the stronghold of Ulm on the occasion of the arrival there of numerous prisoners from France; the following table indicates the number of people who succumbed to the disease in that city:⁷

		Garrison.	Prisoners.	Civil population.
1867	. . .	10	—	25
1868	. . .	3	—	8
1869	. . .	4	—	7
1870	. . .	10	150	15
1871	. . .	15	25	28
1872	. . .	6	—	20
1873	. . .	2	—	5

Since in the case of typhoid fever it is very often impossible to trace the source of infection, it is not surprising that in many instances it is difficult to prove that the disease broke out in any specific locality in consequence of the arrival there of a person, or group of persons, from an infected locality. This applies, for instance, to the epidemic of typhoid fever that occurred in Meiningen in the year 1871. In many places the disease, being prevalent among the prisoners detained there, undoubtedly spread to the civil population, but nowhere did this occur to such an extent as to attract the attention of the authorities.

Among the diseases that broke out in the field-armies during the war of 1870-1, dysentery (epidemic dysentery) played an important rôle, especially in the months of October and November. Prior to the year 1870 it was a comparatively rare disease in Germany, whereas in France it was quite common. This is indicated by the fact that in the years

⁶ Loth, *Der Einfluss der in den letzten 30 Jahren erfolgten hygienischen Massregeln auf den Gang der Infektionskrankheiten und die allgemeine Bevölkerungsbewegung in Erfurt*. *Corr.-Blatt des allgemeinen ärztlichen Vereins von Thüringen*, November 11 and 12, 1901.

⁷ Volz, *Medizinalbericht des Kgl. Oberamtsphysikats vom Jahre 1871*. *Med. Corr.-Blatt des württ. ärztl. Vereins*, November 8 and 9, 1873.

1863-9 the number of deaths due to dysentery in the French army (home stations) was twelve times as large as in the Prussian army. Particularly hard hit were the troops in and around Metz, where dysentery raged continuously and with considerable severity,^{*} as well as in Strassburg and Sedan; in the city and vicinity of Paris the disease, owing to the advanced season of the year, raged less furiously. As a rule it was an open question whether the places in which the German troops contracted the disease were already infected beforehand, or whether the disease had been brought there for the first time by infected divisions of the French army.

Of the German field-army, 38,975 men, all told, contracted dysentery (47.8 per 1,000 of the average number of troops under arms), and of these 2,405 died. Of the average number of French prisoners taken to Germany 41.7 per cent contracted the disease; nearly all the cases of the disease were among the prisoners themselves, who brought the germ with them, and the result was that the number of cases soon began to decrease. It was, of course, inevitable that numerous prisoners should contract the disease, but nowhere did it spread in a serious way to the civil population.

Of very great importance, as far as the war operations were concerned, was the fact that typhus fever, which in former years had played such a fatal rôle, did not make its appearance among the troops; according to most observers, the disease did not break out at all during the war. The Prussian troops along the Russian border were never entirely free from typhus fever; according to the German Health Report, 91 soldiers contracted the disease in the year 1867, 99 in the year 1868, and 37 in the year 1869. France itself had apparently been free from the disease for a long time, but there was always a possibility that it would be conveyed into the country from Algiers, where in the year 1868 a severe epidemic had raged in consequence of a great famine the year

^{*} H. E. Boehnke, *Die Ruhrepidemie im Standort Metz im Sommer 1910. Deutsche mil.-ärztl. Zeitschrift*, vol. xl, p. 803. 1911.

before; of the army in Algiers the disease had carried away 252 men (3.94 per cent).⁹ Consequently both the Germans and the French watched very carefully any outbreaks of a disease involving symptoms of typhus fever. Cases of a disease held by the authorities to be typhus fever were reported from Nancy, Châlons-sur-Marne, Lunéville, and Metz, but careful investigations by von Niemeyer indicate that they were merely cases of typhoid fever exhibiting unusually well developed roseola. Several French physicians (Chauffard, Léon Colin, Kelsch) likewise testify to the fact that typhus fever did not appear in the French army during the entire war. Grellois, to be sure, asserts that typhus fever broke out about the middle of the siege of Metz and then suddenly disappeared. But even this assertion may fairly be questioned; at all events there was not a single soldier in the garrison suffering from the disease at the time of the capitulation, as Grellois himself admits.

According to Michaux,¹⁰ a former chairman of the Medical Society in Metz, a small epidemic of typhus fever raged among the civil inhabitants of that city during the siege. The correctness of this statement, however, is doubted, as no post-mortem examinations were made. It seems that fifty-five children and nine nurses in two orphan asylums contracted the disease, and that twenty-eight of the former and one of the latter succumbed to it; the first cases of the disease were reported early in October, and by the end of November the epidemic was over. This sudden disappearance of the disease was attributed by Michaux to the termination of the siege, a conclusion also upheld by Méry, who studied the disease in the Crimean War. Viry,¹¹ who until a few days

⁹ A. Maurin, *Le typhus exanthématique ou pétéchial, typhus des Arabes*. Paris, 1872. (Ref. in *Gaz. hebdom. de méd. et de chir.*, 1873, vol. xx, p. 110.)
—Grellois, *Histoire médicale du blocus de Metz*. Paris and Metz, 1872.

¹⁰ Michaux, *Du typhus exanthématique à Metz dans la population civile, à la suite du blocus*. *Gaz. hebdom.*, 1873, vol. xx, p. 38.

¹¹ Viry, *Du typhus exanthématique à Metz dans la population civile*. *Gaz. hebdom.*, 1873, vol. xx, p. 56.

before the siege had charge of the field hospital in Vallières (near Metz), where he treated some 250-300 patients every day, performed autopsies on all supposed victims of typhus fever, but in all cases found only the evidences of typhoid fever. Nevertheless, he believes it possible that typhus fever occurred there, and holds the view that the overcrowded condition of the city favoured a spontaneous outbreak of the disease. Laveran,¹³ who was also present in Metz during the siege, disputes the correctness of Michaux's diagnosis, as does the German Health Report, on the ground that the disease attacked children almost exclusively, that it caused such a high mortality, and that it disappeared so suddenly. He seems to think that it was some acute exanthema, probably haemorrhagic measles. This leaves unexplained the fact that a large number of nurses contracted the disease.

III. THE GREAT EPIDEMIC OF SMALL-POX CAUSED BY THE FRANCO-GERMAN WAR

But while typhoid fever and dysentery in the Franco-German War attacked the civil population only in those parts of the country in which the fighting took place, and nowhere acquired epidemic dimensions, and while it is probable that typhus fever did not appear at all at that time, there occurred in connexion with the war a very severe epidemic of small-pox, which raged more extensively and furiously than any other epidemic in the course of the entire century, and spread not only throughout the belligerent countries, but also throughout all Europe.

Everybody knows how severely Europe suffered from epidemics of small-pox in the last part of the eighteenth and first part of the nineteenth centuries, and how the ravages of that disease were first checked by Jenner's wonderful discovery. Nevertheless, small-pox did not entirely disappear

¹³ A. Laveran, *op. cit.*, p. 260.

from Central Europe until the year 1870. The reason for this is found in the fact that compulsory vaccination was introduced in only a few states, and even in them was not properly enforced, and also in the fact that people did not until later begin to realize that vaccination insures immunity only for a period of 12-15 years at most. Consequently new recruits, if they had already been vaccinated once, were not revaccinated when they began to serve. But since sporadic outbreaks of small-pox continued to occur in the Prussian army, orders were issued in the year 1834 that all recruits must be vaccinated. The result was that from that time on, the Prussian troops were very rarely attacked by the disease. The same measure was adopted in Württemberg in 1833, in Baden in 1840, in Bavaria in 1843, in Brunswick in 1858, in the Kingdom of Saxony in 1868, and in the Grand Duchy of Hesse in 1869. Compulsory vaccination did not exist in Prussia or Saxony before the Imperial Vaccination Law was passed in the year 1874; the result was that large numbers of children were never vaccinated. The anti-vaccinationists, especially in the 'sixties, carried on a vigorous agitation, and this had the effect of increasing the number of unvaccinated persons; the number of revaccinated persons had always been small. In South Germany compulsory vaccination for one-year-old children was introduced in the first part of the nineteenth century—in Bavaria and Hesse in 1807, in Baden in 1815, in Württemberg in 1818—but revaccination was not enforced until 1874, when the Imperial Vaccination Law was passed.

The small-pox mortality in Prussia prior to the year 1870 is indicated by the following table, which shows the number of deaths per 10,000 inhabitants:

1831-40	.	.	.	2.6	1866-7	.	.	.	5.2
1841-50	.	.	.	1.7	1867-8	.	.	.	1.8
1851-60	.	.	.	2.1	1868-9	.	.	.	1.9
1861-5	.	.	.	3.5	1869-70	.	.	.	1.7

In the year 1864 an epidemic of small-pox had broken out,

and the war of 1866 had helped it to spread ; but in the year 1868 the disease began to abate, so that by the middle of the year 1870 almost all of Prussia was free from small-pox, as will be set forth in greater detail later on. In South Germany the small-pox mortality was even lower ; in Bavaria it was 0.85 in the years 1861-70, in Württemberg it was 0.9 in the same years, and in the Grand Duchy of Hesse it was 1.9 in the years 1866-70.¹³

1. *The Small-pox Mortality in France in the Years 1870-1*

In the 'sixties small-pox had not been very common in France, but no detailed reports regarding its prevalence there are available ; the reports which the prefects were supposed to hand in are either entirely missing, or else very incomplete. According to the statistics compiled by Vacher,¹⁴ the death-rate increased a little in the years 1864-5, then began to decrease, and in 1869 increased again. The figures which Vacher compiled, and which the Académie de Médecine in Paris has on file, are :

1860	.	.	.	1,662	1865	.	.	.	4,166
1861	.	.	.	1,740	1866	.	.	.	593
1862	.	.	.	1,813	1867	.	.	.	2,081
1863	.	.	.	1,440	1868	.	.	.	3,900
1864	.	.	.	3,290	1869	.	.	.	4,164

Vacher says in regard to these figures : ' As far as the actual number of persons who contracted and succumbed to small-pox are concerned, they express only a small part of the truth. The reports submitted to the Academy of Medicine are rarely complete ; it is even necessary to say that about one-quarter of the Departments never send in reports on the epidemics at all, although the ministerial instructions render the submission of these reports obligatory, and although the Academy never ceases to protest against

¹³ F. Prinzing, *Handbuch der medizinischen Statistik*. Jena, 1906. P. 383.

¹⁴ Vacher, *L'épidémie de variole en 1870-1*. *Gaz. méd. de Paris*, 1876, vol. xlvii, p. 470.

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the negligence of the prefectoral administrators.' Vacher then goes on to say that in the years 1860-9 only 59 out of every 100 infants born were vaccinated, and that at the outbreak of the war about one-third of the French population was unvaccinated; in many Departments, indeed, as many as four-fifths (Aveyron, Corsica, &c.). Small-pox was much more prevalent in the French army than in the German army; according to the German Health Report,¹⁵ the number of deaths caused by the disease was:

PRUSSIAN ARMY.			FRENCH ARMY.	
	Total No.	Per 10,000 men.	Total No.	Per 10,000 men.
1866	8	0.30	46	1.37
1867	2	0.08	70	1.82
1868	1	0.04	169	4.28
1869	1	0.04	95	2.27

The reason for this lies in the fact that a larger proportion of the Prussian soldiers were vaccinated. Since the year 1806 all French recruits who had never been vaccinated were supposed to submit to the inoculation when they presented themselves for service, but this regulation was for years at a time very laxly enforced; consequently in the year 1857 a new order was issued, introducing compulsory vaccination for all recruits. But even this order does not seem to have been everywhere carried out with the necessary strictness, and complaints regarding the partial success of vaccination were frequently made by military physicians.

As stated above, there was a noticeable increase in the small-pox mortality in the year 1869; this increase lasted into the beginning of the year 1870, but was confined to certain localities. Chauffard's¹⁶ report on epidemic diseases in France is more incomplete for the years 1869-70, on account of the war, than for previous years; it was supplemented, partially at least, by the later reports of Vernois¹⁷

¹⁵ Vol. vi, p. 80.

¹⁶ M. Chauffard, *Rapport sur les épidémies pour les années 1869-70. Mémoires de l'Académie de Médecine*, vol. xxx. Paris, 1871-3.

¹⁷ Vernois, *Rapport général sur les épidémies qui ont régné en France*

for the year 1871, and also by the comprehensive report of M. Delpech¹⁸ for the years 1870-2. According to these, epidemics of small-pox occurred in the year 1869 in North-west France (Bretagne), in North-east France (Departments of Aisne, Pas-de-Calais), and in South-east France (Departments of Gers, Ariège, and Pyrénées-Orientales. In the winter of 1869-70 the epidemic continued to spread, and by the end of the year 1870 it included almost the whole of France. The incomplete reports give us no idea as to which Departments were attacked before the outbreak of the war and which after. According to Vernois, the disease appeared that year in 42 Departments, including 132 arrondissements and 539 parishes. But, as stated above, the reports are all very incomplete; a later report submitted by Delpech adds 11 more Departments to the 42. The total number of deaths caused by small-pox in France in the year 1871 is unknown; Vernois reported 14,425 deaths in 39 Departments, but this does not include the figures for Paris, where 10,539 persons succumbed to the disease, or for the Department of Finistère, or for the Department of Sarthe (in regard to which it is merely observed that there were 'beaucoup de morts'), or for several other Departments.

It is a fact that small-pox raged severely among the civil inhabitants of all regions in which the second half of the war was waged (to the south, east, and north of Paris), and that the war itself helped the disease to spread in the eastern Departments (Jura, Doubs, Saône-et-Loire, Haute-Saône). The wide prevalence of the disease among the soldiers is attributed by many French physicians to the fact that the army as a whole had been inadequately vaccinated. If this was true of the regular troops, lack of time made it absolutely impossible to vaccinate all the men that were afterwards assembled in such a precipitate manner. The movements pendant l'année 1871. *Mémoires de l'Académie de Médecine*, vol. xxx, p. 423.

¹⁸ M. Delpech, *Rapport général sur les épidémies pour les années 1870, 1871 et 1872*. *Mém. de l'Acad. de Méd.*, vol. xxxi. Paris, 1875.

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of the soldiers in the cold season of the year (in December there was some bitterly cold weather) made it necessary for friends and enemies to share whatever shelter they could find, regardless of whether the house had previously been occupied by small-pox patients, or whether such patients were actually lying in it at the time. The result was that the disease became very widespread throughout all France. Says Laveran:¹⁹ 'The army, being composed of men who had been in service for a long time, and who had been vaccinated and revaccinated, suffered very little, but the events which took place after the declaration of war altered this state of affairs. The regiments of the Departments on their way to Paris were quartered in the homes of civilians, where they contracted small-pox. The disease spread easily among the young people who, owing to lack of time, had not been revaccinated, and many of whom had perhaps never been vaccinated at all. During the first part of the siege of Paris it was these regiments which suffered the most from small-pox, but later on the epidemic became more general and spread to all the corps. The number of soldiers infected with small-pox during the siege was about 6.76 per 100, or 68 per 1,000.'

Small-pox raged very extensively in besieged strongholds. In Paris an epidemic of small-pox began in November 1869, and the number of deaths caused by the disease there was:²⁰

October (1869) . . .	39	July . . .	1,072
November . . .	93	August . . .	713
December . . .	119	September . . .	700
January . . .	174	October . . .	1,361
February . . .	293	November . . .	1,722
March . . .	406	December . . .	1,837
April . . .	561	January . . .	1,503
May . . .	786	February . . .	763
June . . .	914	March . . .	230

¹⁹ A. Laveran, *op. cit.*, p. 364.

²⁰ M. Delpech, *Rapports sur les faits de l'épidémie variolique observée*

In the middle of the summer the disease was not very prevalent in the garrison; most of the cases were among the civil inhabitants. This condition changed in September, however, when the newly-organized mobile guard arrived in the city, consisting of young men who had not been revaccinated for lack of time, and many of whom had never been vaccinated at all. A severe epidemic now began to rage throughout the garrison; between October 1870 and March 1871 no less than 7,578 men suffering from small-pox were taken to the Hôpital Bicêtre, where the majority of the small-pox patients in the garrison were housed, and where 1,074 (14.17 per cent) of them died. Colin reports that the total number of small-pox patients taken there from the garrison (the total number of men in which he estimates at 70,000 regular troops and 100,000 guardsmen)²¹ was no less than 11,500, and that the number of deaths was 1,600. In November, owing to the rapid dissemination of the disease in the garrison, the number of cases among the civil inhabitants also began to increase.

Small-pox also raged in Metz, but not so extensively as in Paris; the following table indicates the number of men in the garrison carried away by small-pox:

August (15-31)	6
September	40
October	51
November	58
December	21
Total	176

The surrender of the stronghold, on October 27, led to the discovery of 200 small-pox patients in a tobacco factory.

à Paris depuis l'année 1865 jusqu'au 1^{er} juillet 1870. *Ann. d'hyg. publ.*, 1871, series ii, vol. xxxv.—Léon Colin, *La variole au point de vue épidémiologique et prophylactique*. Paris, 1878.—O. du Mesnil, *La mortalité à Paris pendant le siège*. *Ann. d'hyg. publ.*, 1871, series ii, vol. xxxv, p. 418.—H. Sueur, *Étude sur la mortalité à Paris pendant le siège*. Paris, 1872.

²¹ According to Sueur, the number of men in the garrison at the beginning of the siege was 246,000.

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The epidemic among the civil inhabitants came to an end in March 1871.

Belfort, where the garrison consisted mostly of national guards, also experienced a severe epidemic during the siege; likewise Strassburg, Nancy, Toul, and Verdun.

In Strassburg, where cases of small-pox had repeatedly been observed, the disease became more widespread in the summer of 1870, and during the siege the number of cases increased considerably; not until August 1871 did the epidemic come to an end. According to Kriesche and Krieger,²² the number of civilians that succumbed to small-pox in Strassburg, the population of which in the year 1871 was 77,859, was :

	1860.	1870.	1871.
January . . .	2	4	81
February . . .	3	5	52
March . . .	3	9	20
April . . .	13	14	15
May . . .	1	19	14
June . . .	2	23	4
July . . .	6	22	3
August . . .	5	33	1
September . . .	2	66	—
October . . .	—	92	—
November . . .	2	72	1
December . . .	3	92	—
Total . . .	42	451	191

Langres was attacked with especial severity. The garrison there was composed of freshly enlisted troops (mobile and national guards), and averaged 14,629 men. The epidemic began in September 1870, and was not yet over by March 1871. The following table gives the number of cases and deaths according to Claudot.

²² Statistics regarding Alsace and Lorraine, No. 11 (Strassburg, 1878) p. 133.

	No. cases.	No. deaths.
September	81	10
October	145	12
November	301	34
December	598	41
January	621	91
February	402	93
March	186	53
Total	2,334	334

The disease raged very extensively in the French provincial armies that were organized to relieve Paris—thus in the south-western, northern, and south-eastern scenes of the war, small-pox had already made its appearance among the civil inhabitants of those parts of the country in consequence of the continual passing through of soldiers, many of whom had never been vaccinated. Orléans, Chartres, and Le Mans, were the main centres of the pestilence; in the north Amiens, Bois-Guillaume, Rouen, and other places; in the south, besides the strongholds of Belfort and Langres, the cities of Dijon, Besançon, Pontarlier, and several other places. The disease raged furiously throughout this entire region, but the exact number of deaths is not known.

In south-eastern France, small-pox did not become very widespread until after the outbreak of the war; in Lyons, for example, the epidemic began in the second half of October. To be sure, small-pox had appeared in several places in the year 1868, but by the winter of 1868-9 this epidemic was over, although individual cases continued to occur. Regarding the cause of the small-pox epidemic that broke out in Lyons in the autumn of 1870, Fonteret²³ gives us the following information: 'Two causes could not help favouring the outbreak in our city; the movements of the troops that took place at that time, and the emigration of numerous Parisians, who since the beginning of September, that is to say, since the time when the epidemic began to rage furiously in Paris, passed through our city on their way

²³ A. L. Fonteret, *Étude générale des maladies régnantes et des constitutions médicales observées à Lyon de 1864 à 1873*. Paris-Lyons, 1873.

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to Switzerland.' Regarding the course of the epidemic, no statistics covering the entire city are available, but we are able to see from the following table, compiled by Perroud, the number of small-pox patients taken in by the Hôtel-Dieu and the number that died there :

	<i>Patients.</i>	<i>Deaths.</i>
January-June (1870)	126	9
July-September	101	15
October	29	8
November	94	26
December	160	37
January (1871)	148	31
February	147	37
March	135	29
April	124	25
May	84	12
June	45	7
July	38	5
August-December	44	6

In the other cantons of the Department 935 deaths were officially recorded in the years 1870-1. It was observed in Lyons, as in other places, that not only the number of persons who contracted small-pox, but also the virulence of the disease itself, increased ; whereas only 10.6 per cent of 227 sporadic cases resulted fatally between January and September, out of 1,004 persons who contracted the disease between October 1870 and July 1871 no less than 21.7 per cent died.

In the year 1871 small-pox did not spare a single Department in France, although many of them failed to send in reports. Vacher estimates the number of deaths due to the disease in the year 1871 at 58,236, but he adds that the estimate is too small. No report, for example, was sent in by the Department of Sarthe, where in the city of Le Mans alone there were 1,181 deaths, nor by the Department of Haute-Garonne, where there were 1,328 deaths in Toulouse. The total number of unreported deaths, therefore, must have been at least 20,000. It is almost impossible to estimate

the number of deaths that occurred in the year 1870. From the available statistics Vacher estimates the number of deaths caused by the disease in the two years 1870-1 at 89,954, a figure, as he himself says, 'which represents only a part of the reality.' Another estimate made by Vacher, putting the number of deaths caused by small-pox in the years 1869-70 at 200,000, is in all probability not an exaggeration.

In the year 1872, to be sure, small-pox appeared in the form of epidemics in numerous parts of France, but nowhere did it spread so widely as in the two previous years. According to a report worked out by Delpech for the years 1870-2, no less than 42 Departments failed to make any report at all in the year 1872, while only 18 of the remaining 41 Departments sent in reports regarding epidemic outbreaks of small-pox. The epidemic lasted until 1873, in which year reports regarding small-pox epidemics came in from 10 Departments; but only in the Departments of Morbihan and Pyrénées-Orientales was the epidemic apparently somewhat more intense.²⁴

2. *Small-pox among the French Prisoners*

Thanks to the well-vaccinated condition of the German troops, the army suffered comparatively little from small-pox. In the field army 4,385 men (61.3 per 1,000) contracted the disease, and 278 of them (3.5 per cent of those who contracted it) died. Including the officers, physicians, and officials, the number taken sick was 4,991 and the number that died was 297. The number of men in the individual army corps that contracted the disease varied greatly according to the nature and place of their activity; particularly hard hit were the army divisions in the south-western and northern scenes of the war, where the military operations were carried on in fearfully cold weather, and where it was impossible

²⁴ M. Woillez, *Rapport général sur les épidémies pendant l'année 1873. Mém. de l'Acad. de Méd.*, vol. xxxi, p. clvii. 1875.

to quarter the infected soldiers in isolated places by themselves. The French army was attacked much more severely by small-pox, although there are no accurate reports available regarding the prevalence of the disease. According to a report found in the *Vienna Medical Weekly*,²⁵ the total number of French soldiers that succumbed to small-pox was 23,469²⁶; but the accuracy of this number, to be sure, is questionable, since, assuming that there was a very high mortality, it would mean that some 120,000 troops contracted the disease. At all events, the French army, taken as a whole, was badly infected with small-pox, and it was inevitable that among the French prisoners brought to Germany there should be numerous small-pox patients, some in the incubation stage, and some in the convalescent stage of the disease, and that they should infect other people there.

The number of French prisoners taken to Germany in the first few months of the year 1871 was no less than 372,918; the prisoners who at the very beginning, but especially after the surrender of Metz, were transported in large numbers to Germany, had to be distributed throughout the entire Empire, clear over to the eastern boundary. Owing to the fact that new transports of French prisoners were constantly arriving at the German frontier, which, in consequence of severe hardships and privations, they reached in such a weak physical condition that they could not be taken very far inland, it became necessary to transfer some of the earlier arrivals to other places of detention, and this, of course, favoured the further dissemination of the disease. This transference was rendered particularly necessary by the arrival of large numbers of prisoners after the battle of Sedan (September 1), after the capitulation of Metz (October 27), and after the battles of Orléans and Le Mans (December and January respectively). Small-pox occasionally broke out among these prisoners while they were on their way to Germany, rendering it necessary to leave them

²⁵ 1872, p. 896.

²⁶ German Health Report, vol. vi, p. 81.

behind, or else the disease made its appearance when they reached their destination; as a rule, however, the first cases of the disease were observed a few days after their arrival at their place of detention, where they soon infected the other prisoners. The further dissemination of the disease among them was checked by means of wholesale vaccination.

Of the prisoners, 14,178, all told (38 per cent of the total number taken), contracted small-pox, and of these 1,963 (5.26 per cent) died. The statistics in the German Health Report indicate distinctly the number of prisoners in the various states and provinces that contracted and succumbed to the disease; but the total number of prisoners taken is known only in the case of the larger states in the Confederation, since the statistics in the Report are compiled on the basis of the army-corps districts, which do not coincide with the political divisions. The figures for the larger states are as follows:

	<i>Maximum no. prisoners. Patients. Deaths.</i>			<i>per 1,000.</i>	<i>Deaths per 100 cases.</i>
N. Germany, excluding					
Kingdom of Saxony .	283,750	10,547	1,527	37.2	14.5
Kingdom of Saxony .	10,244	248	18	24.2	7.3
Bavaria	40,000	1,607	196	40.0	12.2
Württemberg . .	12,958	390	28	38.1	7.2
Baden	12,083	512	21	42.4	4.1
Grand Duchy of Hesse .	13,810	874	173	63.3	19.8
All Germany . . .	372,918	14,178	1,963	38.0	13.8

The number of people who contracted the disease varied greatly in the different territories, depending upon the locality whence the prisoners came. Accordingly, the figures in the case of the Grand Duchy of Hesse were rendered large by the fact that a severe epidemic of small-pox broke out in the stronghold of Mayence on the occasion of the arrival there of prisoners from Metz. The number of prisoners that contracted and succumbed to small-pox in the larger military prison-dépôts is shown by the following table, which covers only those places in Prussia and the Grand Duchy of Hesse

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in which the maximum number of prisoners held in confinement exceeded 5,000 :

	Maximum no. prisoners.	Patients.	Deaths.	Patients per 1,000.	Deaths per 100 cases.
Spandau .	6,856	77	25	11.2	32.5
Jüterbog .	5,002	196	23	39.2	11.7
Danzig .	9,189	188	24	20.5	12.8
Königsberg .	7,324	221	22	30.2	9.9
Stettin .	21,000	1,303	194	62.0	14.9
Erfurt .	12,400	203	28	16.4	13.8
Magdeburg .	25,450	1,902	271	74.7	14.3
Torgau .	9,359	603	128	64.4	21.2
Wittenberg .	9,753	51	10	5.2	19.6
Posen .	10,303	191	29	18.5	15.2
Glogau .	13,621	1,198	170	88.0	14.2
Neisse .	12,801	385	117	30.1	30.4
Minden .	5,071	98	13	19.3	13.3
Wesel .	16,299	1,042	127	63.9	12.2
Cologne .	13,774	175	24	12.7	13.7
Coblenz .	15,011	571	111	38.0	19.4
Lockstedt .	5,000	47	7	9.4	14.9
Mayence .	14,669	759	165	51.7	21.7

In the case of the Kingdom of Saxony and of the South German States no figures for the individual places are available. We see from the above table that of the large prison-dépôts, Glogau, Magdeburg, Torgau, Wesel, Stettin, and Mayence had the most cases of the disease; generally speaking, the smaller places were less severely attacked, although there are a few exceptions to this statement; in Stralsund, for example, there were 78.2 cases of the disease per 1,000 prisoners, in Papenberg and Hanover 63.4, in Colberg 53.9, and in Münster 52.8.

3. Small-pox in the Immobile German Army

The occurrence of small-pox in the immobile German army was closely related to its prevalence among the prisoners, and it attacked the immobile troops much more severely than the field-troops. The latter, to be sure, were no less exposed to the infection, but the former, taken as a whole, were not nearly so well vaccinated; for it was impossible

in the short time available to see to it that all the reserves were vaccinated, since the troops designated for the field were given the precedence. Thus between conscription and vaccination there was more or less of an interval, during which a large number of the reserves were not protected against the disease. The total number of men in the immobile army that contracted small-pox was 3,472 (excluding Baden and the Grand Duchy of Hesse, regarding which we have no statistics). Assuming that the average number of reserves in the immobile army was 300,424, this means that about 11.6 per 1,000 contracted the disease. The number of cases among the immobile troops in the individual states of the Confederation varied greatly, as indicated by the following table:

	Average no. reserves.	Patients.	Deaths.	Patients per 1,000.	Deaths per 100 cases.
N. Germany, excluding					
Kingdom of Saxony.	238,040	1,703	92	7.15	5.4
Kingdom of Saxony .	17,628	506	30	28.70	5.9
Bavaria . . .	34,634	1,183	39	34.16	3.3
Württemberg . .	10,122	80	1	7.90	1.3

In the larger Prussian garrisons, and in Mayence, the following number of men contracted and succumbed to small-pox:

	Average no. men.	Patients.	Deaths.	Patients per 1,000.	Deaths per 100 cases.
Berlin .	9,110	57	4	6.3	7.0
Danzig .	7,376	45	5	6.1	11.1
Königsberg .	6,426	101	11	15.7	10.9
Stettin .	7,000	74	5	10.6	6.8
Magdeburg .	11,296	84	8	7.4	9.5
Posen .	9,482	113	6	11.9	5.3
Breslau .	8,029	20	—	2.5	—
Wesel .	7,284	117	7	16.0	6.0
Cologne .	9,207	19	1	2.1	5.3
Coblenz .	8,710	83	4	9.5	4.8
Mayence .	9,046	122	9	13.5	7.4

Wherever, as in Breslau, there were few prisoners, the small-pox percentage in the immobile army is low. Regarding the above figures, it must be remarked that those

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pertaining to the garrisons were compiled on the basis of the average number of troops, whereas in the case of the French prisoners the maximum number was used as a basis. The relative number of small-pox cases in the latter table, accordingly, is somewhat too low. Among the prisoners and among the immobile troops, the climax of the pestilence was in January, as indicated by the following table :

	<i>French Prisoners.</i>	<i>Immobile German troops.</i>
July (1870)	2	16
August	27	9
September	85	47
October	273	49
November	1,041	128
December	3,107	358
January (1871)	4,139	802
February	3,151	719
March	1,521	457
April	586	451
May	209	291
June	36	145

The number of French prisoners taken to Germany in the month of July 1870 was small. Of the sixteen immobiles who contracted the disease during that month, nine belonged to the Ninth Army Corps, most of them having been infected inland before the outbreak of the war. That the month of July did not constitute the starting-point of the subsequent epidemic is evident from the fact that the prevalence of the disease decreased in August, as well as from countless individual observations.

4. *The Epidemic of Small-pox in the Civil Population of Germany in 1871-2*

In the summer of 1870 Germany was almost free from small-pox. Later on, thousands of French prisoners, almost all of them hailing from infected localities, were within a short time scattered throughout the entire German Empire, and since the inhabitants of many parts of the country, as stated above, were very insufficiently vaccinated, it was

inevitable that epidemics of small-pox should break out everywhere. The disease was disseminated in several ways : by prisoners who had contracted it on their way to Germany, or who had to be transported from an infected to an uninfected locality, by persons into whose systems the infection had entered but had not yet revealed its presence, and by uninfected persons who had come in contact with infected persons ; numerous persons, moreover, contracted the disease by handling the clothing, blankets, and other effects of small-pox patients.

'The dissemination of the disease,' says the German Health Report,²⁷ 'which broke out simultaneously in various parts of Germany, was helped along in numerous ways. From the lazarets and from the prisons it was communicated by nurses and guards, and by working men and tradesmen, to the civil population and to the local garrison, and from there it spread to the surrounding country. It was conveyed from place to place, often considerable distances, by the moving population itself, not infrequently by marching troops, and particularly by the removal of prisoners from one place of detention to another ; the latter measure had to be adopted in order to make room for the fresh transports of prisoners that were constantly arriving, many of them in such an exhausted condition that it was necessary to spare them the long and trying journey to the far East. Thus the prisons at Mayence, Coblenz, Wesel, Minden, &c. became the foci from which the disease was transplanted into hitherto uninfected places.'

The result was that there broke out in Germany an epidemic of small-pox which raged more furiously and extensively than any other epidemic in the course of the nineteenth century. Whereas among the prisoners-of-war and among the immobile German troops (who were particularly exposed to the infection) the disease reached its climax as early as January 1871, among the civil inhabitants of the

²⁷ Vol. vi, p. 29.

country this climax did not come until later in the year; in the more out-of-the-way regions, moreover, where there was less intercourse, the height of the epidemic was not reached until the year 1872.

(a) *The Dissemination of Small-pox in Prussia and in the smaller North German States*

After the prevalence of small-pox in Prussia had again increased somewhat in the years 1864-7, in the following years the number of cases of the disease grew steadily smaller, so that around the middle of the year 1870 the country was practically free from it. Its prevalence again increased in the first months of the year 1871. The following table indicates the number of deaths caused by the disease in Prussia in the course of twelve years:

	Total no. deaths.	Deaths per 10,000 inhabitants.
1862	3,894	2.1
1863	6,250	3.4
1864	8,904	4.6
1865	8,403	4.4
1866	11,937	6.2
1867	8,500	4.3
1868	4,510	1.8
1869	4,655	1.9
1870	4,200	1.7
1871	59,839	24.3
1872	66,660 ²³	26.9
1873	8,932	3.6

In the year 1874 only one person per 10,000 inhabitants succumbed to the disease. Among the French prisoners small-pox usually broke out every soon after their arrival at their place of detention, while among the inhabitants of the places in which the prisons were located it usually did not make its appearance until several months later. Guttstadt,²⁴ in his excellent work on the *Epidemic of Small-pox*

²³ According to a written communication from the Royal Prussian Bureau of Statistics.

²⁴ A. Guttstadt, *Die Pockenepidemie in Preussen, insbesondere in Berlin 1870-2*. *Zeitschrift des Kgl. Preuss. Statist. Bureau's*, vol. xiii, p. 116. 1873.

in Prussia in the Years 1870-1, has compiled a table of statistics indicating in a number of places when the disease first made its appearance among the prisoners and among the civil inhabitants. We reproduce this table below, with a few small alterations. In some of the places mentioned there was no military prison; only prisoners suffering from small-pox were taken to them, usually resulting in an epidemic of the disease among the civil inhabitants. The table clearly indicates the connexion between the small-pox epidemics among the civil inhabitants and the outbreaks of the disease among the prisoners; regarding the manner of dissemination in the case of the individual epidemics we shall have more to say further on.

THE APPEARANCE OF SMALL-POX AMONG PRISONERS-OF-WAR AND AMONG THE CIVIL INHABITANTS IN THE GERMAN CITIES IN THE YEARS 1870-1

Cities.	FRENCH PRISONERS.				CIVIL INHABITANTS.		
	First arrival of infected persons.	Maximum no.	First Case.	No. Patients.	First Outbreak.	No. Deaths (1870).	No. Deaths (1871).
1. East Prussia							
Königsberg	Aug. 15	7,324	Aug. 15	221	Aug. (end)	74	558
2. West Prussia							
Danzig	Aug. 25	9,189	Aug. 28	188	Sep. 16	5	709
Graudenz	Aug. 5	1,437	Aug. 28	9	Fall	0	11
Thorn	Aug. 21	2,001	Aug. 27	11	Fall	8	147
3. Brandenburg							
Berlin	—	—	Aug. 20	24	Nov.	170	5,212
Frankfurt-o.-O.	—	756	Nov. 12	8	Jan.	3	117
Küstrin	Aug. 7	2,204	Aug. 17	9	End (1870)	1	32
Landsberg-o.-t.-W.	Nov.	133	Nov.	1	Nov. 20	0	97
4. Pomerania							
Colberg	Nov. 4	3,246	Nov. 14	175	Jan. 7	0	27
Greifswald	—	—	Oct. 18	3	Dec. 13	1	109
Schivelbein	Jan. 24	603	Jan. 26	24	Feb. 20	0	43

The book contains a survey of the small-pox mortality in Prussia in the year 1871 according to Governmental Districts and Communities. The figures for the year 1872 have not been published; they were placed at my disposal, in manuscript form, by the Royal Prussian Bureau of Statistics.

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THE APPEARANCE OF SMALL-POX AMONG PRISONERS-OF-WAR, ETC. (continued)

Cities.	FRENCH PRISONERS.				CIVIL INHABITANTS.		
	First arrival of infected persons.	Maximum no.	First Case.	No. Patients.	First Outbreak.	No. Deaths (1870).	No. Deaths (1871).
Stettin .	Aug. 12	21,000	Aug. 22	1,303	Dec.	13	422
Stralsund .	Dec. 4	2,991	Dec. 9	234	Jan. 7	0	366
Stolp .	Jan.	1,376	Feb. 3	5	Aug. (1871)	0	16
5. Posen							
Bromberg .	—	—	Dec. 15	14	Feb. 10	0	280
Posen .	Oct. 4	10,303	Sep.	191	Feb.	79	466
Schneidemühl	Nov.	940	Jan.	5	Jan.	0	40
6. Silesia							
Breslau .	—	—	Nov.	4	—	28	742
Glatz .	Oct. 12	2,284	Oct. 6	96	Feb.	2	38
Glogau .	Sep. 1	13,621	Sep. 16	1,198	Oct. 7	10	114
Görlitz .	—	326	Nov.	5	Jan.	0	164
Oppeln .	Nov. 6	1,027	Jan.	23	Jan.	0	38
Schweidnitz .	Jan. 28	1,821	Jan.	75	March	0	52
7. Saxony							
Aschersleben .	Dec. 2	1,618	Jan.	12	Dec.	0	53
Erfurt .	Sep. 12	12,400	Sep. 14	203	Dec.	18	235
Halberstadt .	Jan.	619	Jan. 28	6	Feb.	0	29
Halle-o.-t.-S.	—	—	Nov. 1	28	March	0	195
Magdeburg .	Aug. 30	25,450	Sep. 15	1,902	Nov. 18	22	646
Mülhausen .	Dec.	1,065	Dec. (early)	57	Feb. 1	4	25
Nordhausen .	—	—	Sep.	8	Jan.	0	233
Quedlinburg .	—	927	Nov. 27	29	Nov.	1	3
Torgau .	Sep. (end)	9,359	Oct. 4	603	Nov.	0	67
Wittenberg .	Aug. 27	9,723	Sep. 5	51	Oct. 3	5	100
8. Schleswig-Holstein							
Lockstedt .	—	5,000	Oct.	47	End 1870	—	—
Rendsburg .	Nov.	2,590	Nov. 26	44	End 1870	0	114
Schleswig .	Dec. 3	1,570	Dec. 13	17	End 1870	10	38
9. Hanover							
Stade .	—	2,284	Jan. 28	32	1871	0	3
10. Westphalia							
Hamm .	—	—	Oct.	12	Nov. 22	9	114
Minden .	Sep. 10	5,071	Sep.	98	Nov. 2	5	114
Münster .	Jan. (end)	2,709	Jan. (end)	143	Feb. 12	2	67
11. Hesse-Nassau							
Cassel .	—	—	Nov.	13	Nov.	6	99
Frankfurt .	—	—	Dec.	8	Jan.	23	125
12. Rhine Province							
Düsseldorf .	—	981	Aug. 15	13	Oct. (1870)	6	524
Coblenz .	Sep. 15	15,011	Sep. 23	571	Nov. 2	0	81
Cologne .	Sep. 1	13,774	Sep. 1	175	Sep. 12	65	418
Wesel .	Sep. 9	16,299	Sep. 20	1,042	Nov.	9	84

The small-pox mortality varied greatly in the different Prussian Governmental Districts; particularly noteworthy is the fact that it was considerably higher in the eastern provinces, especially in the year 1872, than in the western provinces, notwithstanding the fact that the latter were exposed to the infection much sooner and much more frequently in consequence of the arrival and passing through of French prisoners. The only plausible explanation of this is the fact that the inhabitants of eastern Prussia were not so thoroughly vaccinated as those in the west; this, however, was not because the anti-vaccinationists were more influential in the east, but because the eastern provinces had fewer physicians than the western provinces, where medical advice and help were far more accessible, and where the population was more enlightened. The effect of vaccination is clearly revealed in those Governmental Districts in the west which introduced compulsory vaccination before they were incorporated into Prussia; Schleswig-Holstein did this in 1811, Hanover in 1821, the Governmental District of Wiesbaden in 1820, and the Governmental District of Cassel in 1828. All these parts of the country had fewer cases of small-pox. The Governmental Districts in which large military prisons were located, and those in which, owing to a higher industrial development, there was more intercourse of all kinds, were attacked earlier by small-pox than the others. Of the western provinces only the two highly industrial districts of Arnsberg and Düsseldorf, and the district of Trèves, were very severely attacked. The living conditions among the working people were not so good at that time as they are to-day, and the close quarters must necessarily have favoured the dissemination of small-pox; furthermore, the constant moving about of the working inhabitants, many of whom did not live where they were employed, helped to spread it. Thus it was observed in the vicinity of Leipzig, that the villages inhabited by working people were much more severely attacked by small-pox than

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those inhabited by farmers, with their stationary and settled population. The high figures in the case of the Governmental District of Trèves may be explained by the fact that its location made it necessary for a large proportion of the French prisoners that were taken into Prussia to pass through it. The number of deaths per 10,000 inhabitants in the various Governmental Districts of Prussia is indicated by the following table (the districts which introduced compulsory vaccination in the year 1870 are designated with an asterisk):

<i>Governmental District.</i>	1870.	1871.	1872.
Königsberg . . .	3.5	24.5	37.8
Gumbinnen . . .	4.1	9.7	40.0
Danzig . . .	2.8	42.4	67.6
Marienwerder . . .	3.7	17.7	76.2
Berlin . . .	2.1	63.1	31.4
Potsdam . . .	1.8	25.8	28.7
Frankfurt . . .	0.1	18.6	40.0
Stettin . . .	1.6	29.9	21.4
Köslin . . .	2.2	12.2	36.7
Stralsund . . .	0.2	34.0	3.9
Posen . . .	6.0	48.3	58.0
Bromberg . . .	5.3	24.1	86.6
Breslau . . .	3.1	27.5	33.6
Oppeln . . .	1.7	22.5	42.1
Liegnitz . . .	0.5	11.2	16.8
Magdeburg . . .	0.6	27.5	16.3
Merseburg . . .	1.0	28.8	20.2
Erfurt . . .	1.4	25.3	14.4
Schleswig-Holstein *	0.2	18.0	5.0
Hanover *	0.3	5.3	8.8
Hildesheim *	0.1	13.8	19.6
Lüneburg *	0.2	7.8	6.5
Stade *	1.3	5.6	4.9
Osnabrück *	0.3	6.0	0.8
Aurich *	0.0	5.4	1.1
Münster . . .	0.3	11.6	10.8
Minden . . .	0.2	13.4	8.9
Arnsberg . . .	0.4	39.1	33.8
Cassel *	0.5	9.0	6.2
Wiesbaden *	1.7	9.7	2.5
Coblenz . . .	1.2	22.8	6.6
Düsseldorf . . .	0.3	32.9	20.5
Cologne . . .	1.4	14.6	2.8
Trèves . . .	2.5	34.0	3.1
Aix-la-Chapelle . . .	0.8	14.5	7.8
Hohenzollern . . .	1.7	19.9	—

In East Prussia small-pox broke out very frequently in the city and vicinity of Königsberg. According to Guttstadt, small-pox patients, in consequence of the proximity of the Russian border, kept coming to the hospital in Königsberg, into which twelve persons suffering from the disease were received between January 1 and August 1, 1870. The first prisoners-of-war arrived at Königsberg on August 15, 1870, and among them was a small-pox patient. Shortly afterwards two more cases of the disease occurred among the prisoners. The first case among the civil population occurred in the hospital on September 2. Owing to the constant intercourse between the prisoners and the civil inhabitants the epidemic spread very rapidly. The districts surrounding Königsberg were very severely attacked in the year 1871, while the more remote districts, especially those along the boundary of West Prussia, were not attacked until the year 1872. In the districts around Königsberg the mortality per 10,000 inhabitants was as follows :

	1871.	1872.
Königsberg (city)	49·8	3·6
Königsberg (vicinity) . . .	78·4	13·3
Labiau	42·4	30·6
Wehlau	103·1	8·9
Insternburg	32·2	47·3
Fischhausen	38·7	17·9

In the districts of East Prussia more remote from Königsberg the following number of deaths per 10,000 inhabitants were reported :

	1871.	1872.
Memel	5·5	37·0
Gerdauen	18·9	53·1
Rastenburg	65·9	26·8
Friedland	13·7	35·5
Eylau	15·2	29·7
Heiligenbeil	19·7	8·1
Braunsberg	2·9	10·1
Heilsberg	6·3	27·2
Rössel	25·7	52·2
Allenstein	7·4	108·5
Ortelsburg	20·6	124·4

	1871.	1872.
Neidenburg	1.7	45.6
Osterode	4.7	76.5
Mohrungen	2.1	36.2
Prus. Holland	1.1	8.3
Heydekrug	—	43.3
Niederung	23.7	84.6
Tilsit	5.4	46.3
Ragnit	4.6	51.7
Pillkallen	0.7	17.4
Stallupönen	0.7	14.0
Gumbinnen	17.1	35.8
Darkehmen	3.8	25.3
Angeburg	10.9	81.0
Goldap	2.3	41.2
Oletzko	1.0	24.7
Lyk	2.4	17.8
Lötzen	5.1	28.3
Sensburg	13.3	52.1
Johannisburg	15.8	12.4

Several of the last fifteen districts (Heydekrug to Johannisburg in the above table) had relatively few cases of small-pox; the reason for this was that the governmental district of Gumbinnen had but little intercourse, that few prisoners were taken there at all, and that there were no cases of small-pox among the few that were taken there.

Danzig was the chief seat of the pestilence in West Prussia, since large numbers of prisoners were confined there; per 10,000 inhabitants 79.6 succumbed to small-pox in the year 1871, and 35.9 in the year 1872. Says Liévin:³⁰ 'For a considerable length of time no cases of small-pox occurred in Danzig, but in the month of September 1870 the beginnings of an epidemic were observed. Although this happened shortly after the arrival of the first prisoners, nevertheless the beginning of the epidemic was probably not connected in any causal way with this circumstance. For, in the first place, the prisoners were French soldiers captured in the battles of Weissenburg and Wörth and were in all probability healthy men, judging from the fact that not

³⁰ A. Liévin, *Die Pockenepidemie in den Jahren 1871 und 1872 in Danzig. Viertelj. für öff. Ges.-pflege*, vol. v, p. 366. 1873.

a single case of the disease occurred among them in the first few months; in the second place, the disease broke out very sporadically in the first three or four months, individual outbreaks occurring here and there in the city, just as has been the case in Danzig almost every year. But during this indigenous pestilence a large number of badly infected prisoners arrived from the Metz garrison; this gave rise to an epidemic which, had the prisoners not arrived, would probably have progressed in the usual, scarcely noticeable manner; as it was, however, the epidemic attained to the largest dimensions known to the memory of man.'

According to Liévin, the total number of small-pox cases in Danzig and its suburbs (including the garrison and the prisoners-of-war) was :

	1870.		1871.		1872.	
	Patients.	Deaths.	Patients.	Deaths.	Patients.	Deaths.
January .	—	—	123	24	245	77
February .	—	—	129	28	222	77
March .	—	—	201	51	153	75
April .	—	—	365	70	89	33
May .	—	—	459	109	34	17
June .	—	—	442	123	19	12
July .	—	—	182	71	13	3
August .	—	—	130	49	8	7
September .	2	—	111	37	5	3
October .	4	2	124	57	2	—
November .	13	2	136	42	—	—
December .	34	3	135	39	—	—

Of the 9,189 prisoners in Danzig, 188 contracted the disease, and 24 died; the largest number of cases was reported in the month of January. Of the garrison, which consisted of 7,376 men, only 45 contracted the disease,²¹ and 5 died.

As in East Prussia, so also in West Prussia, only those districts suffered severely from small-pox in which large military prisons were located; in the remaining districts the pestilence did not acquire much severity until the

²¹ According to the German Health Report. Liévin reports seventy-one cases of the disease and nine deaths, since he includes all the German soldiers, even the transients in the immobile army.

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following year. Of the three strongholds, Danzig, Thorn, and Graudenz, the last two had but few cases of small-pox among the prisoners; in the districts surrounding them the following number of deaths per 1,000 inhabitants were reported:

	1871.	1872.
Danzig (city) . . .	79·6	35·9
Danzig (district) . . .	91·2	59·2
Prussian Stargard . . .	55·5	105·0
Rosenberg . . .	40·5	66·5
Thorn . . .	46·0	41·7

In the remaining districts of West Prussia the mortality due to small-pox was as follows:

	1871.	1872.
Elbing . . .	18·7	71·8
Marienburg . . .	16·0	68·6
Berent . . .	6·6	47·7
Karthaus . . .	7·7	67·9
Neustadt . . .	22·9	89·0
Stuhm . . .	21·4	97·8
Marienwerder . . .	21·3	62·3
Löbau . . .	4·9	88·0
Strassburg . . .	6·1	80·7
Kulm . . .	25·9	65·5
Graudenz . . .	5·4	55·9
Schwetz . . .	11·0	118·6
Konitz . . .	9·7	79·7
Schlochau . . .	6·9	69·5
Łódź . . .	23·4	74·1
deutsch-Krone . . .	10·2	92·1

All these districts, especially Prussian-Stargard and Schwetz, which lay side by side along the Vistula, had an unusually high mortality in the year 1872.

The Governmental District of Posen, in the Province of Posen, was much more severely attacked by small-pox in the year 1871 than the Governmental District of Bromberg, whereas in the year 1872 the condition was reversed. In the former district cases of small-pox had occurred even before a transport of French prisoners arrived there in the middle of September; in that month two of the prisoners

contracted the disease, and these two cases constituted the beginning of a large epidemic among the prisoners. According to Guttstadt, the epidemic among the civil inhabitants did not commence until February 1872, and it lasted until the middle of that year. The districts along the boundary of Posen (Schroda, Wreschen, Schrimm, Kosten, and Samter) had the largest number of cases and deaths in the year 1871, whereas in the remaining, more distant, districts the figures for the year 1871 are for the most part small, and do not begin to grow large until the year 1872. The following table indicates the number of deaths per 10,000 inhabitants in the districts mentioned :

	1871.	1872.
Posen (city)	82.5	4.4
Posen (district) . . .	103.2	53.0
Schroda	105.6	51.3
Wreschen	116.5	63.1
Schrimm	61.5	88.4
Kosten	75.9	72.4
Samter	66.9	83.4
Pleschen	17.9	56.7
Buk	38.2	42.2
Obornik	22.2	76.3
Birnbaum	15.4	63.6
Meseritz	13.0	53.3
Bomst	20.5	34.1
Fraustadt	21.5	26.0
Gröben	55.8	79.5
Krotoschin	22.1	62.0
Adelnau	26.3	29.4
Schildberg	14.6	91.6

The first prisoners that contracted small-pox in the city of Bromberg were committed to the lazaret on December 15; the epidemic among the civil inhabitants began there on February 10, 1871. The figures for 1871 were higher than those for 1872 in only three districts—Bromberg itself, the adjacent Schubin, and Czarnikau; the last-named district lies in the west and borders on Samter in the Governmental District of Posen. All the other districts that are not mentioned had higher figures in the year 1872. The following

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table indicates the number of deaths per 10,000 inhabitants in the districts named :

	1871.	1872.
Czarnikau	47.0	69.8
Wirsitz	14.7	65.4
Bromberg	89.7	72.3
Schubin	59.4	96.5
Inowrazlaw	20.4	102.5
Mogilno	22.6	96.5
Chlodziesen	24.7	79.7
Wongrowitz	26.3	153.1
Gnesen	32.9	56.0

Of the prisoners in the Governmental District of Liegnitz, those in the stronghold of Glogau were the most severely attacked. In the garrison, too, the number of small-pox patients was quite large. The first prisoners arrived on September 1, and the first cases of small-pox among them appeared on September 16; the maximum number of prisoners there was 13,621, and of these 1,198 contracted the disease. The first case among the civil inhabitants was reported on October 7; in December the disease was conveyed to the surrounding villages, especially by tradespeople who had visited the markets in Glogau. The adjacent districts suffered relatively little in the year 1871. In the governmental district of Liegnitz, with the exception of Glogau, where there were 31.2 deaths per 10,000 inhabitants, only Görlitz and Liegnitz had high figures in the year 1871. In the city of Görlitz a prisoner was committed to the lazaret in November 1870, and in December, when a transport of prisoners passed through the city, one of them was left behind there; the epidemic among the civil inhabitants began in January 1871. Again in the year 1872 small-pox did not become very widespread except in the districts of Liegnitz, Jauer, Hirschberg, and Görlitz; Liegnitz, with a mortality of 35.2 per 10,000 inhabitants, had the highest figures.

In the Governmental District of Breslau cases of small-pox were frequently reported. In the city of Breslau the first case among the prisoners occurred on November 11, the second

on January 27, the third and fourth in April and May, 1871; the first cases in the garrison likewise occurred in November; from January on, the number of cases grew steadily larger. The number of reported cases in the city was :²

January . . .	33	September . . .	30
February . . .	68	October . . .	609
March . . .	90	November . . .	1,026
April . . .	68	December . . .	1,229
May . . .	134	January . . .	1,3
June . . .	235	February . . .	790
July . . .	287	March . . .	462
August . . .	271	April . . .	242

The epidemic was very severe. Whereas during the previous epidemics (1856-7, 1863-4, and 1868-9) only about seven per cent of the patients treated in the hospital died, in 1871-2 no less than 392 out of 2,416 patients (13.4 per cent) taken there were carried away by the disease. Of 1,322 patients, moreover, 182 had hemorrhagic small-pox; of these 166 died.

The immediate vicinity of Breslau was very severely attacked; in the districts lying to the south of the Oder small-pox raged extensively in the year 1871, whereas those districts on the north side of the river did not suffer very severely until the year 1872. This may be explained by the fact that the extensive industrial activity of the districts south-west of the Oder rendered considerable intercourse with Breslau necessary. The following table indicates the number of deaths per 10,000 inhabitants in the districts north-east of the Oder :

	1871.	1872.
Namslau . . .	4.0	48.5
Wartenberg . . .	14.0	55.4
Oels . . .	22.3	71.0
Trebnitz . . .	8.6	27.8
Militsch . . .	10.0	37.2
Gurau . . .	15.5	20.2
Steinau . . .	12.1	34.2
Wohlau . . .	41.1	38.4

² von Pastau, *Beiträge zur Pockenstatistik nach den Erfahrungen aus der Pockenepidemie 1871-2 in Breslau.* *Deutsches Arch. für klin. Med.*, vol. xii, p. 112. 1873.

and in the districts south-west of the Oder :

	1871.	1872.
Neumarkt	13·5	61·5
Breslau (city) . . .	35·7	27·3
Breslau (district) . .	57·3	74·9
Ohlau	12·2	23·3
Brieg	5·2	17·2
Strehlau	30·3	33·8
Nimptsch	23·5	37·4
Münsterberg	53·0	29·0
Frankenstein	34·3	14·3
Reichenbach	32·0	19·8
Schweidnitz	26·3	13·4
Striegau	16·9	48·2
Waldenburg	57·7	36·2
Glatz	39·1	13·4
Neurode	20·2	35·6
Habelschwerdt	8·2	7·3

In Upper Silesia the stronghold of Neisse had a maximum number of 12,801 prisoners, among whom there were 385 cases of small-pox and 117 deaths; in the garrison, which averaged 4,452 men, there were 39 cases and 1 death. The first cases among the prisoners were reported on September 25, and in the garrison in November. The civil inhabitants suffered very little in the year 1871, and the number of deaths among them did not begin to grow large until 1872. Only in the district of Neisse and in the neighbouring district of Grottkau was the number of deaths larger in 1871 than in 1872; in all the other districts there were more deaths in 1872. The districts which were most severely attacked in the year 1872 were—Kreuzburg (78·2 deaths per 10,000 inhabitants), Posenberg (58·6), Gross-Strelitz (60·0), Beuthen (56·5), and Kosel (62·4).

In the Province of Pomerania the city of Stettin came to be a general rendezvous for prisoners of war; the maximum number of them, owing to the continual arrival of new transports, was no less than 21,000. The first transport arrived on August 12, and the first small-pox patient among them was committed to the hospital on August 28. Of the prisoners, 1,303 contracted the disease and 194 succumbed

to it. The climate of the epidemic came in January, when there were 462 cases reported. The first cases in the garrison, which averaged 7,000 men, occurred in October, the first man to contract the disease being a sick-attendant, and the second an artilleryman; after that, all the branches of service were attacked. The epidemic in the garrison, however, was confined to 74 men, only 5 of whom died. In December the disease spread to the civil population; the number of cases (including the garrison) was 422 (55.5 per 10,000) in the year 1871, and 113 (14.8 per 10,000) in the following year. In the Governmental District of Stettin only the communities surrounding the city of Stettin had high small-pox figures in the year 1871, and these communities were also more severely attacked in the year 1872. The following table indicates the number of deaths per 10,000 inhabitants in the communities mentioned:

	1871.	1872.
Demmin	1.1	2.6
Anklam	4.3	15.8
Usedom-Wollin	16.4	16.2
Uckermünde	24.7	26.4
Randow	70.4	29.3
Greifenhagen	37.8	26.3
Pyritz	15.3	23.1
Saazig	27.8	27.4
Naugard	32.4	32.6
Kammin	10.3	13.3
Greifenberg	4.3	10.4
Regenwalde	16.4	27.5

At the stronghold of Kolberg (Governmental District of Köslin) 3,500 prisoners arrived on November 4, and in December and January they were followed by the arrival of more transports. The first cases among these prisoners were reported on November 14; all told, 175 of them contracted small-pox and 24 succumbed to it. On January 7 the disease spread to the civil population, but did not rage very extensively in the city; 127 civilians contracted it and 24 succumbed to it, and in August 1871 it disappeared; only two men in the garrison were taken sick. Many of

the prisoners in Kolberg were transported to Stettin, Köslin, and Stolp, and in all three of these places the disease broke out among the civil inhabitants. In Schivelbein an infected soldier was found among the prisoners who arrived on January 24, 1871, and on January 26 he was committed to the lazaret; in February a working-man contracted the disease in the same lazaret, and after that the epidemic spread throughout the city and did not disappear until October 1872; it carried away a relatively large number of people and spread to two neighbouring villages. But taking the Governmental District of Köslin as a whole, it may be said that the dissemination of small-pox was moderate; the district of Schlawe had the largest number of deaths (22.7 per 10,000 inhabitants). On the other hand, in the year 1872 small-pox caused a very large number of deaths in the districts of Neustettin, Dramburg, Schlawe, Rummelsburg, and Stolp.

The number of cases of the disease in the Governmental District of Stralsund was very large. Small-pox broke out very severely among the French prisoners in the city of Stralsund, the maximum number of whom was 2,991; of these 234 contracted the disease and 35 succumbed to it. The prisoners arrived on December 4, and among them was a small-pox patient; he was committed to the lazaret on December 9. In the garrison, which averaged 3,700 men, there were only thirty-one cases of the disease and one death. The first case among the civil inhabitants occurred on January 7; the patient was a clerk who lived near the lazaret and had had more or less intercourse with the prisoners. Of twenty-three more cases that occurred before January 15, at least six were shown to be directly attributable to the epidemic among the prisoners; one of the six was a sick-attendant, two were working-men in the military lazaret, and the other three were members of the families of attendants. The epidemic then became very widespread; to the end of the year 1871 the number of deaths was 366, and the number of reported cases was 1,807. In Greifswald

a French prisoner contracted small-pox on October 18, 1870, in the military reserve lazaret, another on November 1, and a third on November 16. The first civilian, an attendant, contracted the disease on December 13, and on January 6, 1871, a working-man, who had transported the attendant from the military lazaret to the town small-pox hospital, was taken sick. Until February 14, ten more cases were reported, and then the epidemic began. Up to the end of the year 1871 no less than 578 cases of the disease and 111 deaths caused by it were reported to the authorities. In the year 1872 there were only a few deaths caused by small-pox throughout the entire Governmental District of Stralsund.

In the case of the two adjacent confederate states of Mecklenburg-Schwerin and Mecklenburg-Strelitz no small-pox mortality statistics are available. On September 20, prisoners from Metz were taken to the reserve lazaret in Schwerin, and among them was a small-pox patient who died eight days later. In the same month an assistant in the lazaret was taken sick, and in October and December two more members of the lazaret staff contracted the disease. The pestilence spread to the civil population because the attendants who were commissioned to dispose of the effects of the dead, instead of destroying them, sold or gave them to the inhabitants. The epidemic, which spread rapidly throughout the surrounding country, was quite severe and lasted until March 1871. In Wismar two cases of small-pox were reported among the prisoners in December, and these were followed by six more cases in January and February; in the garrison, which averaged 1,219 men, there were 48 cases of the disease (5 in January, 32 in February, 9 in March, and 2 in April); 3 of the 48 were fatal. At Rostock 649 prisoners arrived on November 11, and these were followed by 544 more on December 14; among the latter there were two small-pox patients, and in the course of the next few months forty-one more cases of the disease and six deaths were reported.

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Berlin suffered severely from an epidemic of small-pox in the years 1871-2. The last large epidemic there had occurred in the year 1801, and had carried away 1,626 out of 176,700 inhabitants. In the year 1864 another rather mild epidemic had broken out, but had quickly disappeared. In the year 1870 the number of small-pox patients in Berlin was small; an average of nine persons per month succumbed to the disease between the first part of August and the last part of November. In the month of December 1870 the death-rate began to increase, at first rather slowly; the number of deaths in that month was 22, and in March 1872 it was 176. The epidemic now began to spread rapidly, and in June it reached its climax with 648 deaths; during the summer it abated a little, but in the fall it began to rage more and more furiously until December, when it reached a second climax with 671 deaths. The progress of the epidemic is shown by the following table, taken from Guttstadt's excellent book. The number of deaths caused by small-pox in Berlin was :

November (1870)	. . . 9	October	600
December	22	November	660
January (1871) . .	48	December	671
February	80	January (1872) . .	445
March	176	February	256
April	349	March	151
May	430	April	117
June	648	May	76
July	532	June	33
August	528	July	18
September	490	August	10

The disease was unusually severe and virulent; fifteen per cent of the patients died in the hospitals. The total number of deaths ²² in the year 1871, when the population of the city was 826,341, was 5,212, or 63.1 per 10,000 inhabitants; thus the total mortality, which in the years 1867-70

²² Reports vary; Guttstadt himself gives two figures for 1871—5,212 and 5,084; for 1872 he gives 1,106, whereas a report, in manuscript, of the Prussian Bureau of Statistics, gives the figure 2,598.

had been 31·8 per cent (including the still-births), reached the prodigious height of 40·4 per cent. The cause of the wide dissemination of small-pox in Berlin was the fact that large numbers of people, including children, had never been vaccinated, and only a few had ever been revaccinated. According to a rough estimate made by Guttstadt, of Berlin's total population in the year 1871 some 20,000 people had never been vaccinated, 530,000 had been vaccinated only once, and only 270,000 had been revaccinated; fourteen per cent of those who had never been vaccinated, two per cent of those who had been vaccinated once, and 0·5 per cent of those who had been revaccinated, contracted the disease. In the garrison, which averaged 9,110 men, only 57 cases of the disease and 4 deaths were reported between July 1, 1870, and June 30, 1871. But few prisoners were taken to Berlin; only 24 prisoners suffering from small-pox were committed to the lazarets, and of these only 4 died; the first two cases were in August and September.

In the Governmental District of Potsdam only those districts which bordered directly on Berlin were severely attacked by small-pox in the year 1871, e.g. the districts of Niederbarnim, Teltow, Jüterbog, Luckenwalde, and East and West Havelland; in the following years those districts bordering on Niederbarnim (as Oberbarnim, Angermünde, and Templin) also suffered severely. In the city of Potsdam two Frenchmen contracted the disease on February 6, shortly after their arrival there, and on February 19 a soldier who had accompanied them was taken sick. In April an epidemic of rather wide extent was raging in the city; the number of deaths caused by small-pox in April 1871 was 157 (34·5 per 10,000 inhabitants), and in April 1872 it was 71 (16·2 per 10,000). In the city of Brandenburg-on-the-Havel an infected French soldier arrived in February 1871; he communicated the disease to his attendant, and in that very month cases of small-pox were reported among the civil inhabitants of the city, although it was impossible to prove

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a connexion between them and that of the French soldier. The number of deaths, all told, was 59. The number of deaths per 10,000 inhabitants in the Governmental District of Potsdam was :

	1871.	1872.
Prenzlau	7.5	11.1
Templin	17.5	28.4
Angermünde	15.0	53.4
Oberbarnim	18.2	33.8
Niederbarnim	36.5	27.1
Teltow	46.4	40.4
Beeskow-Storkow	20.6	39.8
Jüterbog-Luckenwalde	43.4	38.7
Zauch-Belzig	14.6	38.1
East Havelland	37.7	14.7
West Havelland	32.3	33.4
Ruppin	26.8	13.3
East Priegnitz	14.9	12.6
West Priegnitz	16.8	23.3

In the Governmental District of Frankfurt small-pox raged only to a moderate extent in the year 1871. In Frankfurt-on-the-Oder itself there were sporadic outbreaks of the disease every year. On November 12 two infected prisoners from Metz were committed to the hospital, and before the end of that month two attendants contracted the disease; a few cases also occurred in the garrison in the month of November. Of the French prisoners, whose maximum number was 756, eight contracted the disease and two succumbed to it; in the garrison, which averaged 1,881 men, there were 21 cases of the disease and no deaths. Among the civil inhabitants, on the other hand, a somewhat more severe epidemic raged; whereas in the year 1870 only 21 cases of the disease were reported, in the year 1871 there were 19 cases in the month of January alone; until May some 196 persons contracted the disease, which after that began to abate. The number of deaths, all told, in the year 1871 was 117, and in 1872 it was 70. In Landsberg-on-the-Warthe small-pox broke out in the middle of November in consequence of the arrival of an infected prisoner; the first case among the civil inhabitants

was reported on November 20. The total number of deaths in the year 1871 was 97. At Kottbus an infected French prisoner arrived on October 1, resulting in a rather severe epidemic among the civil inhabitants (114 deaths in the year 1871). Not until the year 1872 did the disease become very widespread in the Governmental District of Frankfurt; with the exception of the city of Frankfurt there was no district which suffered more severely in the year 1871 than in 1872. In most of the districts small-pox broke out very virulently, the only exceptions being the districts of Lübben and Spremberg.

Regarding the dissemination of small-pox in the Province of Saxony Guttstadt gives us very detailed information. In the years 1871-2 the disease was equally prevalent in all three governmental districts in the Province. In the city of Magdeburg the last case was reported on May 24, 1870, and from then until November there was not a single case among the civil inhabitants. The first prisoners arrived at Magdeburg in the latter part of August, and on September 14 a case of small-pox was observed among them; this was followed by ten more cases in that month. Of the prisoners brought to Magdeburg, the maximum number of whom was no less than 25,450, some 1,092 contracted the disease, and of these 271 died. The largest number of cases was reported in the month of February 1871. Of the garrison, which averaged 11,296 men, there were only 84 cases of the disease (7.4 per cent), and of these 8 died. The first case among the civil inhabitants was reported on November 18, 1870, and this was followed by seven more cases in that month, occurring in various parts of the city. The number of deaths in the year 1871 was 646 (56.4 per 10,000 inhabitants), and in the year 1872 only 45 deaths were reported. From the city of Magdeburg small-pox spread to the surrounding country.

On November 25 a transport of prisoners from Metz, after having been detained for two or three weeks in the badly

infected city of Minden, arrived at Quedlinburg; two days later the first case of small-pox occurred among them. A second transport, which arrived on January 31, 1871, likewise brought infected men with it. Among the civil inhabitants small-pox did not become very widespread, and only three civilians succumbed to the disease in the year 1871. In Aschersleben small-pox broke out among the prisoners in January 1871, a few days after their arrival from Mayence, and the number of cases reported in the months of January and February was only twelve. According to Guttstadt, small-pox was already prevalent in the civil population in December, when the disease was given an opportunity to spread to the surrounding country. According to the German Health Report, on the other hand, small-pox did not appear in the city until February, when the proprietor of an inn, which had been converted into a small-pox hospital, contracted it. The total number of deaths in the year 1871 amounted to 53 (31.6 per 10,000 inhabitants). On January 26 and 27, 1871, some 360 prisoners, four of them infected with small-pox, arrived at Halberstadt, having come from Mayence. The number of deaths in the city of Halberstadt in the year 1871 was 29 (11.4 per 10,000 inhabitants). Only those districts in the Governmental District of Magdeburg which bordered on the city of Magdeburg were more severely attacked; Kalbe (43.1 deaths per 10,000 inhabitants), Wanzleben (37.7), and Wollmirstedt (29.2). In addition to these the district of Wernigerode also had a very high small-pox mortality in the year 1871 (70.5 per 10,000). In those districts further away from Magdeburg—Osterburg, Salzwedel, Aschersleben, and Halberstadt—the climax of the small-pox mortality was not reached until the year 1872, whereas in the other districts it was reached in 1871.

In the Governmental District of Merseburg small-pox broke out very severely in the stronghold of Torgau, where in the last part of September and in the first part of December prisoners arrived from Strassburg and Metz, respectively; in

both transports, but especially in the second, there were infected men. The first cases of the disease were reported on October 4. Of the prisoners, the maximum number of whom was 9,359, some 603 (64.4 per 1,000) contracted the disease and 128 (21.2 per cent of those who contracted it) died. The epidemic, accordingly, was unusually severe among the prisoners, and it reached its climax in January. In the German garrison, which averaged 3,943 men, there were, all told, 75 cases of the disease (19.0 per 1,000) and five deaths. Among the civil inhabitants the first persons to contract the disease in the last part of November and first part of December were a woman, who was employed as a laundress in the garrison lazaret, her sons, and a woman who had visited the place where the prisoners were confined. The epidemic did not break out until December 22, on which day a single case was reported; on the following day twelve more cases were reported. The total number of deaths was 67 (61.7 per 10,000). Very soon the infection spread throughout the entire vicinity of Torgau, which in the year 1871 had a very high small-pox mortality; by 1872 the disease had almost disappeared from the city.

In Wittenberg, which before the arrival of the prisoners was absolutely free from small-pox, a transport arrived on August 27, and on September 5 the first small-pox patients were taken to the lazaret. Among the Frenchmen the disease did not rage very extensively; of a maximum number of 9,753, only fifty-one (5.2 per cent) contracted the disease and ten succumbed to it. Of the garrison, which averaged 2,845 men, seventeen contracted the disease and two died. Among the civil inhabitants the first case of small-pox was reported on October 3; it was that of a pastor who had been serving as curate among the prisoners. This case was followed by several others, most of the victims being persons who lived in the vicinity of the pastor's dwelling-place. The pestilence then began to spread rapidly among the civil inhabitants, finally developing into a severe epidemic. There

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were 768 cases reported, distributed as indicated by the following table :

October (1870)	26	April	76
November	66	May	83
December	102	June	61
January (1871)	107	July	27
February	97	August	8
March	113	September	1

Of those who contracted the disease five died in the year 1870 and 100 died in the following year (86.5 per 10,000 inhabitants). Likewise in the country surrounding Wittenberg small-pox was very widespread in the year 1871.

Among the French prisoners in Halle-on-the-Saale there were twenty-eight cases of small-pox in January, and February, and at the same time a few cases of the disease were reported in the regiment that was transferred from Halle to Mülhausen. In the first part of March 1871, cases were reported among the civil inhabitants, and they constituted the beginning of a large epidemic. In the year 1871 there were 195 deaths due to the disease (37.0 per 10,000 inhabitants) and in the year 1872 there were forty-one more deaths.

Generally speaking, small-pox was rather uniformly spread throughout the Governmental District of Merseburg in the year 1871; the districts of Torgau and Wittenberg were the only ones that were attacked with particular severity. In the western part of the governmental district small-pox raged more furiously in 1872 than in 1871.

The city of Erfurt (Governmental District of Erfurt) in the year 1869 had been the scene of a small-pox epidemic, which lasted well into the following year. The last cases of the disease occurring in connexion with this epidemic were reported on August 13, 1870. To be sure, the disease revealed its presence on September 27 and 30 among the French prisoners, who had arrived on August 21, and these cases were followed by many more when a new transport

of prisoners arrived from Metz ; but of all the prisoners in Erfurt, the maximum number of whom was no less than 12,400, only 203 men (16.4 per cent), all told, contracted the disease, and of these only 28 died. In the garrison, which averaged 4,627 men, there were 25 cases of small-pox and no deaths. On the other hand, in December there began among the civil inhabitants an epidemic which spread rapidly and reached its climax in April 1871, with 244 cases. According to Guttstadt, the number of deaths due to small-pox was 253 (53.9 per 10,000 inhabitants) in the year 1871, and 33 in the year 1872. The epidemic did not come to an end until June 1872.³⁴ In Mülhausen, prisoners from Mayence, where small-pox was prevalent, arrived in the first part of December, and some of them were already infected with the disease. On February 1 the pestilence spread to the civil population, and carried away twenty-five persons in the course of the entire year. Nordhausen was free from small-pox in the summer of 1870 ; but the disease was twice borne into the city, in October 1870 and in January 1871, by prisoners. The first cases among the civil inhabitants were reported in the latter month, after which they increased rapidly in number. In the year 1870 there were 233 deaths (109.5 per 10,000 inhabitants) due to the pestilence. Except in these two cities of Erfurt and Nordhausen the disease did not become very widespread in the year 1871 in any part of the Governmental District of Erfurt.

Regarding the appearance of small-pox in Brunswick, the Thuringian States, and Anhalt, only a small amount of information is available. In the city of Brunswick a German soldier, who had come from Carignan, contracted the disease in September, and in November and January six Frenchmen were taken sick ; two of the latter died. In the garrison, which averaged 1,389 men, there were four cases of small-pox in March and June. According to a manuscript report of the Brunswick Bureau of Statistics, the number of deaths due

³⁴ Loth, loc. cit.

to small-pox throughout the entire Duchy was 2 in the year 1870, 269 in the year 1871, and 215 in the year 1872. At Gotha a French prisoner suffering from small-pox was left behind in January, and another prisoner in the same transport contracted the disease a few days later; in February there were a few isolated cases in the garrison. At Weimar a German field-soldier suffering from small-pox arrived in February; he infected the woman who took care of him, and presently the disease broke out in the city. In Altenburg two infected sub-officers of the field-army and two Frenchmen, likewise suffering from the disease, were committed to the reserve-lazaret, and shortly afterwards a small epidemic broke out in the garrison. There were ten cases of the disease and no deaths among the Frenchmen, and in the garrison, which averaged 1,178 men, there were eleven cases and one death. Among the civil inhabitants the first to be attacked were a sick-attendant and a journeyman mason; the latter had removed the soot from a stove in a room occupied by small-pox patients.

In the Duchy of Saxe-Meiningen, according to a manuscript report of the local Bureau of Statistics, the number of deaths due to small-pox in the years 1860-71 was 133, in the year 1872 it was 37, and in the year 1873 it was 47. The figures for the several years before 1871 are not available. Every transport of sick soldiers from France brought small-pox patients to the city of Meiningen; five cases, the first in January, were reported in the garrison, which consisted of 1,663 men, and in the same month there were cases among the civil inhabitants. It was impossible, however, to establish a connexion between those in the garrison and those in the city.

In Dessau, one French prisoner in October and another in November contracted the disease, which in January appeared throughout the city and became epidemic. In the garrison, which consisted of 1,228 men, there were ten cases of the disease, none of which terminated fatally.

Hamburg,²⁶ after the by no means mild epidemic that raged there in the year 1864 (19.7 deaths per 10,000 inhabitants) suffered very little from the disease in the following years; in 1868 there were five deaths reported, and in 1869 the number increased to twenty. After the Franco-German War an epidemic of small-pox raged in Hamburg, which was more extensive and more furious than almost any other epidemic that Germany had ever experienced. In the years 1870-2 no less than 4,077 persons succumbed to small-pox in Hamburg. Among French prisoners there were twenty cases of the disease and one death, and among the German troops there were twelve cases and no deaths. The disease first made its appearance in the summer of 1870, when there were a few cases in the city; but in October they began to multiply considerably, and by the first of the year the disease was spreading rapidly. The number of deaths in Hamburg was:

	1870.	1871.	1872.
Jan	—	69	158
Feb	—	107	—
Mar	—	163	—
Apr	—	226	—
May	—	364	—
Jun	2	503	—
Jul	2	554	—
Aug	6	578	—
Sept	5	373	—
Oct	10	311	—
Nov	24	229	—
Dec	34	170	1
Entire year	83	3,647	323
Per 10,000 inhabitants . . .	3.6	154.4	9.5

The figures for 1870 and 1871 include the city and suburbs, and those for 1872 the entire State—a fact, however, which makes but little difference. This severe epidemic gave rise to the passing of a law on January 30, 1872, rendering

²⁶ *Die Gesundheitsverhältnisse Hamburgs im 19. Jahrhundert.* Hamburg, 1901. P. 161.

vaccination compulsory; the enforcement of this law was greatly facilitated in the following years by the fact that everybody very soon came to recognize the superiority of animal lymph.

In Schleswig-Holstein the city of Altona, which bordered on Hamburg, was very severely attacked by small-pox. No detailed information regarding the epidemic there is available; the population of the city in the year 1871 was 83,177, and in the same year 965 persons (116.0 per 10,000 inhabitants) succumbed to small-pox; in the following year there were only two deaths. In the year 1871 only three districts were more severely attacked by the disease than Altona—Rendsburg, Steinburg, and Stollmarn. The city of Rendsburg was an important seat of the disease, which broke out there on November 16 among the prisoners, shortly after their arrival; the epidemic, however, was rather mild, since of 2,590 prisoners only forty-four contracted the disease and only three died. The garrison, which averaged 2,876 men, was somewhat more severely attacked; 109 men contracted the disease (37.9 per 1,000), and four succumbed to it. The epidemic became unusually widespread in the city; 114 inhabitants (98.8 per 10,000) succumbed to small-pox there in the year 1871.

Of 5,000 prisoners confined in Lockstedt, 47 contracted small-pox, the first in October, and the rest in February; only a few men in the German garrison were attacked by the disease. From Lockstedt the disease spread to the surrounding country, including Itzehoe, where it caused 102 deaths (110.6 per 10,000 inhabitants) in the year 1871. From there small-pox spread in all directions; it was conveyed to Stollmarn chiefly by working-men from Hamburg and Altona who lived in the country.

In the city of Lübeck, the population of which in the year 1871 was 52,158, the following number of people, according to the report of the local Bureau of Statistics, contracted and succumbed to small-pox:

	<i>Patients.</i>	<i>Deaths.</i>
1870	24	1
1871	315	36
1872	99	15

Judging from this table, the city was not very severely attacked by the disease.

In the province of Hanover, small-pox did not become very widespread in the years 1871 and 1872, thanks to the introduction of compulsory vaccination; this is evident from one of the tables reproduced above. In the year 1871 the districts of Osterode and Harburg had the highest figures, 32.4 and 18.7 deaths respectively per 10,000 inhabitants, and in the following year Osterode had 47.4 and Einbeck was second with 24.6. In the city of Hanover the cases of the disease in the garrison were few and far between; the first cases among the prisoners were reported in August; their maximum number was 2,299, and fifty-six of them contracted the disease and three died. In the city seventy-one persons succumbed to the disease in the year 1871, and eighty-nine persons in the year 1872 (8.1 and 10.2, respectively, per 10,000 inhabitants). In Hildesheim, cases of the disease, which had been brought there from France, were reported in March 1871; seven soldiers in the garrison were taken sick. In Göttingen (Governmental District of Hildesheim) persons who had contracted the disease in France were taken to the lazaret in March 1871; whether or not this was responsible for the communication of the disease to the civil inhabitants, among whom a severe epidemic had never before raged, cannot be ascertained. At Einbeck (Governmental District of Hildesheim) several small-pox convalescents belonging to the field-army arrived in February 1871. In Osnabrück a soldier belonging to the field-army contracted the disease in December. In Papenburg (Governmental District of Osnabrück) the dépôt where the prisoners were confined was very severely attacked; of 993 prisoners, sixty-three contracted the disease and two died. In Lingen

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(Governmental District of Osnabrück) there was a rather large number of Frenchmen suffering from small-pox—fifty-three, all told, of whom three died. In Stade thirty-two out of 2,284 prisoners contracted the disease in January and February, and five of them died.

In Bremen the epidemic of small-pox did not become very widespread. According to a report issued by the local Bureau of Statistics, there were only twenty-six cases of the disease there in the year 1870 and no deaths; in the following years the number of deaths was as follows: ²⁵

	<i>Bremen—City.</i>			<i>Rest of State.</i>
1871	.	.	45	9
1872	.	.	20	21
1873	.	.	3	—

In the case of the Grand Duchy of Oldenburg the number of deaths due to small-pox is unknown. In the city of Oldenburg three French prisoners (two in October and one in November) contracted small-pox, and one case of the disease was reported in the garrison in March. Regarding the appearance of small-pox among the civil inhabitants no information is available.

The governmental districts of Münster and Minden (Province of Westphalia) were only moderately afflicted by small-pox in the years 1870-2. According to Guttstadt, a few cases of the disease were reported in the city of Münster in May 1869, and these were followed by seven more in July 1870. After that no cases were reported until November 9, 1870, when a pastor, who had been ministering to the prisoners in Lingen, contracted the disease; another pastor fared in the same way. These were followed by eight more cases in two buildings in Münster itself, and another two in the community of Überwasser, which bordered on the city of Münster. In the latter part of the year 1870 no cases were reported in

²⁵ The figures have reference to all the deaths that occurred among all persons in the city and in the city-state; the older year-books of the State of Bremen include only the resident inhabitants, so that the above figures do not concur with the figures found in the older records.

the garrison. In the latter part of January 1871 some 3,000 prisoners were brought from Wesel, which was badly infected with the disease, to Münster, and there four of them were immediately taken sick. This was the beginning of a rather extensive epidemic among the prisoners, 143 of whom contracted the disease and thirteen died; the maximum number of cases (107) was reported in February. In the garrison, which numbered 3,910 men, a small number of cases was reported from February on; of twenty-one cases reported, one resulted fatally. In the same month a small epidemic raged among the civil inhabitants, reaching its climax in May. The following table indicates the number of people who contracted the disease:

November (1870)	2	May	91
December	8	June	84
January (1871)	0	July	43
February	13	August	9
March	30	September	5
April	48	October	1

The number of deaths in the year 1871 was sixty-seven (26.9 per 10,000 inhabitants), and in the year 1872 it was twenty-two; most of the cases occurred in the quarters of the city known as Jüdefeld and Lamberti, on account of the proximity of the prison along the Buddenturm. In the surrounding communities the epidemic reached its climax in July, and after that began to abate rapidly. The only other region in the Governmental District of Münster in which small-pox made its appearance was Recklinghausen, which borders on the Rhenish-Westphalian coal-fields, whence the infection doubtless came; in Recklinghausen there were 28.8 deaths per 10,000 inhabitants in the year 1871, and 46.4 per 10,000 in the year 1872.

In the Governmental District of Minden only the city and vicinity of Minden were severely attacked; before the war began they were free from small-pox. On September 10 the first prisoners arrived, and among them cases of small-pox had already been observed in the first part of that month;

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in the course of the next eight days more cases were reported, and of a total number of 5,071 prisoners 98 contracted the disease and 13 succumbed to it. In the garrison, which numbered 5,071 men, one case was reported in October, four in December, and fifty-two in the following months; only two cases terminated fatally. The first case among the civil inhabitants was reported on November 5; the victim was a laundress who had done washing for the prisoners. This constituted the beginning of an epidemic in which 651 persons contracted the disease and 114 succumbed to it; the population of the city was 16,862. The epidemic spread to the surrounding localities, presumably because the woollen blankets which the patients had used were sold there. Throughout the entire district of Minden 391 persons (51.0 per 10,000 inhabitants) succumbed to small-pox in the year 1871, whereas in the following year only 34 deaths were reported, all told.

In the Governmental District of Arnsberg the districts of Dortmund and Bochum, which belonged to the Rhenish-Westphalian coal region, and were even at that time densely populated, were severely attacked by small-pox; the districts of Hamm and Hagen, which bordered on the latter, were likewise very hard hit. The following table indicates the number of persons per 10,000 inhabitants that succumbed to small-pox in the districts mentioned:

	1871.	1872.
Arnsberg	12.7	11.4
Meschede	6.5	4.3
Brilon	10.0	23.1
Lippstadt	2.9	9.8
Soest	9.6	26.0
Hamm	38.1	30.0
Dortmund	55.3	38.4
Bochum	123.1	71.8
Hagen	13.7	54.2
Iserlohn	4.3	16.7
Altena	18.5	12.7
Olpe	18.8	9.4
Siegen	9.2	7.4
Wittgenstein	10.1	11.6

In the city of Bochum alone 698 persons (329.0 per 10,000 inhabitants) succumbed to small-pox in the year 1871; almost one-half of the deaths that year were caused by small-pox. The city of Dortmund itself was less severely attacked in the year 1871 than the country surrounding it; in the city alone 96 persons (21.5 per 10,000) died of the disease, whereas in the district of Dortmund, excluding the city, there were 661 deaths (71.4 per 10,000). The near-by city of Hamm was very severely attacked; 114 persons (67.3 per 10,000) succumbed there in the year 1871, whereas the total number of deaths in the rest of the district amounted to 113 (26.5 per 10,000). According to Guttstadt, a prisoner contracted the disease there on November 2 and subsequently died. The first cases among the civil inhabitants were reported on November 22; the victims were an occupant of a public-house situated near the lazaret, and a Catholic priest who had visited the patients.

In the Rhine Province the districts of the Rhenish-Westphalian industrial centre belonging to the Governmental District of Düsseldorf also suffered severely from small-pox: e. g. the districts of Crefeld, Duisburg, Düsseldorf, Essen, Mettmann, Elberfeld, and Barmen; later on, in the year 1872, the districts of Lennep and Solingen were also severely attacked. The districts in the Governmental District of Düsseldorf lying on the left side of the Rhine were all, with the exception of Crefeld, mildly attacked. The following table indicates the number of deaths per 10,000 inhabitants in the various districts mentioned:

The districts on the left side of the Rhine:

	1871.	1872.
Cleve	4.8	1.5
Geldern	7.8	0.8
Mörs	8.4	8.8
Kempen	7.3	13.3
Gladbach	1.6	5.5
Grevenbroich	1.8	2.3
Neum	9.3	4.3
Crefeld	54.7	33.7

The districts on the right side of the Rhine:

	1871.	1872.
Rees	23.5	4.6
Duisburg	100.7	10.2
Essen	52.9	37.0
Düsseldorf	56.2	3.5
Elberfeld (city)	47.5	44.0
Barmen	24.8	49.1
Mettmann	31.3	36.7
Lennepe	3.3	31.4
Solingen	5.1	36.3

On August 17 and 18, seven infected Frenchmen arrived at the city of Düsseldorf and were at once isolated in a house outside the city limits; in November a few more infected prisoners arrived. In the small German garrison (523 men) no cases were observed until later (April and May). In December 1870, 20 cases among the civil inhabitants were reported; they constituted the beginning of an epidemic which developed rapidly, reached its climax in July with 648 cases, and then quickly disappeared. In the following year, 524 small-pox patients (75.0 per 10,000 inhabitants) died in the city of Düsseldorf.

In the district of Duisburg eleven cases of small-pox were reported in December 1870, and here again the epidemic developed rapidly, reaching its climax (1,549 cases) in May 1871. The city of Duisburg was most severely attacked; 529 persons (173.2 per 10,000 inhabitants) died there of small-pox in the year 1871.

In the stronghold of Wesel (district of Rees), where the prisoners were confined in the stronghold itself on Buderich Island and Spellmer Heath, persons suffering from small-pox arrived in August and September; and still more arrived in November with a transport of prisoners from Metz. Of the 16,299 prisoners, 1,042 (63.9 per 1,000) contracted small-pox, and 127 (12.2 per cent of those taken sick) died; the largest number of cases was reported in January. In the garrison, which numbered 7,284 men, there were 117 cases

of the disease and seven deaths. Since the inhabitants of the city of Wesel and of the surrounding country had continual intercourse with the prisoners, the dissemination of the disease was inevitable; the epidemic among the civil inhabitants began in November and carried away nine persons in 1870 and eighty-four persons in 1871.

In Elberfeld the epidemic did not become very spread until December 1871. The first fatal case in the city of Essen was reported in January 1871; the epidemic then increased in fury until June 1871 (48 deaths), when it began to abate. In the following year it revived a little in May, when 26 cases were reported. All told, 272 persons (53.0 per 10,000 inhabitants) died of small-pox in Essen in the year 1871, and 112 persons (21.0 per 10,000) in the year 1872.³⁶

In the Governmental District of Cologne small-pox became more or less widespread in the years 1871-2 in the city and immediate vicinity of Cologne; in the few years preceding the war Cologne had had numerous cases of the disease, and in the year 1866 a small epidemic (223 cases) had occurred there; in the year 1869 some forty cases were officially reported. According to Guttstadt, the first transport of prisoners, among them a small-pox patient, passed through Cologne early in September. Of the gradually increasing number of prisoners (the maximum number, including Deutz, was 13,774) 175, all told, contracted the disease and twenty-four succumbed to it. In the garrison, which numbered 9,207 men, there were only nineteen cases of the disease and one death. Among the civil inhabitants an epidemic broke out as early as September 12; it reached its climax in April 1871, abated somewhat during the summer, and in October and November started up again. The following table indicates the number of people that contracted and succumbed

³⁶ M. Wahl, *Statistik der Geburts- und Sterblichkeitsverhältnisse der Stadt Essen, 1868-1879*. *Zentralblatt für allg. Ges.-pflege*, vol. i, p. 352. 1882.

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to the disease in the months mentioned (the population of the city at that time was 129,000):

	<i>Patients.</i>	<i>Deaths.</i>
September (1870)	24	3
October	65	18
November	80	15
December	97	27
January (1871)	194	53
February	336	79
March	434	87
April	510	71
May	318	50
June	159	34
July	75	13
August	35	10
September	16	3
October	66	5
November	34	9
December	7	2

According to this table, 63 persons (4.9 per 10,000 inhabitants) died in the months September–December 1870, and 416 persons (32.2 per 10,000) died in the year 1871; in the following year 25 more deaths (1.9 per 10,000) were reported. In the district of Cologne (excluding the city) 212 persons (24.3 per 10,000 inhabitants) succumbed to small-pox in the year 1871; in all the other districts the number of deaths caused by the disease was small.

In the Governmental District of Coblenz the city of Coblenz and the adjacent districts of Neuwied and Mayen, as well as the district of Kreuznach, which lay in the extreme south and very near the scene of the war, were most severely attacked in the year 1871. In the stronghold of Coblenz, according to Guttstadt, a locksmith contracted the disease in the latter part of August; he had become infected while sitting beside the body of his brother, who had succumbed to the disease in Casbach, a village near Lingen, in Hanover. The first prisoners arrived in Coblenz on September 15, and on September 23 one of them was found to be suffering from small-pox and was taken to the lazaret; new transports

of prisoners kept bringing more cases of the disease. Of the 15,011 French prisoners that arrived there, a large number contracted the disease; the maximum number was in January, when 571 (38.0 per 1,000) were taken sick, and 111 died (19.4 per cent of the patients). In the garrison, which consisted of 8,710 men, there were 83 cases of the disease and four deaths in the month of November. Among the civil inhabitants of Coblenz 81 persons (24.2 per 10,000) died of small-pox in the year 1871; in the rest of the district of Coblenz 277 persons (67.1 per 10,000) died; in the district of Mayen there were 234 deaths (43.9 per 10,000), in the district of Neuwied 220 deaths (32.3), and in the district of Kreuznach 129 deaths (21.2). In the year 1872 the epidemic was not at all widespread in any of the districts.

In the Governmental District of Aix-la-Chapelle only the district of Malmedy suffered severely in the year 1871; being in the south-western part of the governmental district it was, like the border districts in the Governmental District of Trèves mentioned below, exposed to the first onrush of the transports of prisoners. The number of deaths there in the year 1871 was 333 (111.0 per 10,000), whereas in the following year not a single death due to small-pox was reported in the district. At Jülich a Frenchman suffering from small-pox arrived in July, and in November an epidemic broke out among the prisoners; 188 cases of small-pox were reported, and of these only three terminated fatally. In the garrison only one man contracted the disease.

The governmental district of Trèves had a very large number of small-pox cases in the year 1871, since a large part of it bordered directly on the enemy's country, so that large numbers of sick and convalescent prisoners passed through it. In the year 1872 only a few cases of small-pox were reported, except in the immediate vicinity of Trèves, where the pestilence became quite widespread. The following table indicates the number of deaths per 10,000 inhabitants in the districts mentioned:

	1871.	1872.
Daun	3.0	1.9
Wittlich	18.7	1.3
Bernkastel	6.1	0.5
St. Wendel	20.0	—
Ottweiler	36.2	0.4
Trèves (city)	12.6	4.1
Trèves (district)	17.2	20.6
Prüm	33.2	0.9
Bitburg	23.6	1.4
Saarburg	60.9	1.0
Merzig	51.5	2.8
Saarlouis	80.0	0.2
Saarbrücken	49.5	0.3

The province of Hesse-Nassau suffered very little from small-pox in the years 1871-2, since a compulsory vaccination law had long been in force there. Large epidemics did not occur anywhere. In Cassel a case of small-pox had occurred in the summer of 1870, and after that there were no more cases until November 9; on that day a man was taken sick who had been acting as a sutler among the German troops before Paris and had there been infected. On November 18 a nurse employed in a house in which a field-soldier was quartered contracted the disease, and this case was followed by six more cases among the civil inhabitants; all told, six persons succumbed to small-pox in the city of Cassel in the year 1870, ninety-nine persons (21.4 per 10,000 inhabitants) in the year 1871, and four persons in the year 1872.

In Frankfurt-on-the-Main a few cases of small-pox were reported in the course of the year 1870; the disease was perhaps conveyed thither from Stuttgart. After the commencement of the war it was borne into the city by numerous transports of soldiers and prisoners, and a widespread epidemic soon developed. In the garrison thirty-two cases of the disease were reported. After the Rochus Hospital was opened to small-pox patients, in April, the epidemic reached its climax; the following table, found in the German Health Report, indicates the number of patients received

into the above-mentioned hospital and the number that died there :

	No. patients.	No. deaths.
January	81	13
February	148	16
March	168	17
April	177	25
May	—	—
June	36	12

In August the epidemic came to an end. All told, there were 23 deaths due to small-pox in Frankfurt-on-the-Main in 1870, 125 deaths (13.7 per 10,000 inhabitants) in 1871, and 25 deaths in 1872.

In Wiesbaden an epidemic began in December 1870, and reached its climax in February. The population of the city was 35,463, and of these 6 succumbed to small-pox in 1870, 71 in 1871, and two in 1872. Regarding the origin of this small epidemic no information is available.

(b) *The Dissemination of Small-pox in Saxony in the Years 1870-2*

The kingdom of Saxony experienced a very severe epidemic of small-pox in consequence of the Franco-German War. The wide dissemination of the disease is attributed by Wunderlich to the fact that vaccination, in consequence of the wild agitation of the anti-vaccinationists, was insufficiently practised; prior to the year 1874 vaccination was not compulsory in Saxony. Even before the war broke out small-pox had appeared in Saxony in the form of epidemics, e.g. in Chemnitz and Freiberg. The following table indicates the number of persons, all told, that succumbed to small-pox in Saxony : ²⁷

1871	9,935 (estimate)	38.8 per 10,000 inhabitants.
1872	5,863	22.8 " " "
1873	1,772	6.9 " " "

²⁷ *Vierter und fünfter Jahresbericht über das Medizinalwesen im Königreich Sachsen auf die Jahre 1870-1 und 1872-3. Dresden, 1874 and 1875.*

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Of the immobile troops stationed in Saxony, the total number of whom was 17,628, some 506, all told, contracted the disease and 90 succumbed to it.

Regarding the dissemination of small-pox in Leipzig and vicinity we have accurate information.²⁸ In Leipzig itself small-pox patients were housed only in the city hospital. A small epidemic of the disease had raged there in the years 1868-9. In the year 1870, eighteen patients were committed to the hospital in the months of January-July, after which there were no more cases until October; on the 22nd, 23rd, and 31st of that month a single patient, each time a French prisoner, was taken to the hospital. On November 7 a laundress employed in the hospital contracted the disease; the first case among the civil inhabitants was reported on November 10. In December an epidemic began which spread rapidly and reached its climax in April. The following table indicates the number of patients committed to the hospital in the months mentioned:

March (1871)	.	.	.	.	.	384
April	.	.	.	.	.	388
May	.	.	.	.	.	361
June	.	.	.	.	.	231
July	.	.	.	.	.	73

The epidemic lasted until the year 1872, and the highest mortality was in the month of May 1871; the number of deaths caused by the disease in the various months was as follows:

October (1870)	.	.	1	July	.	.	.	91
November	.	.	2	August	.	.	.	32
December	.	.	9	September	.	.	.	24
January (1871)	.	.	20	October	.	.	.	14
February	.	.	47	November	.	.	.	13
March	.	.	117	December	.	.	.	10
April	.	.	233	January (1872)	.	.	.	4
May	.	.	246	February	.	.	.	5
June	.	.	205	March and April	.	.	.	4

²⁸ C. A. Wunderlich, *Mitteilungen über die gegenwärtige Pockenepidemie in Leipzig*. Arch. für Heilkunde, vol. xiii, p. 97. 1872.

Among these 1,077 victims of the disease were 21 soldiers and 27 outsiders from the surrounding villages. The disease was very virulent. Of the 1,727 patients treated in the hospital 253 died (14.7 per cent). The population of Leipzig in the year 1871 was 106,922, so that the 1,052 deaths of the year 1871 correspond to a mortality of 98.4 per 10,000 inhabitants. Of 3,726 prisoners, 98 (76.3 per 10,000) contracted the disease and 9 died.

In the district of Leipzig no case of small-pox was officially reported between the months of May and October. When the disease broke out in the city of Leipzig it was of course inevitable, in view of the constant intercourse between the city and the surrounding country, that it should spread rapidly among the working people who were employed in the city and lived in the country, first to the immediate vicinity, and then, following the chief lines of traffic, to the more remote localities.³⁹ Of 113 places 106 were attacked; only two peasant-villages and five isolated farm-estates were spared. The villages inhabited by working people were much more severely attacked than those inhabited by farmers and peasants. The progress of the epidemic is indicated by the following figures, which Siegel says are incomplete, since not all the cases were reported, and which correspond at best to only one-half of the actual number of cases and deaths:

	Cases.	Deaths.
October (1870)	2	—
November	9	3
December	22	5
January (1871)	107	16
February	215	42
March	398	103
April	816	255
May	944	367
June	732	311
July	288	161

³⁹ Siegel, *Die Pockenepidemie des Jahres 1871 im Umkreise von Leipzig* Arch. für Heilkunde, vol. xiv, p. 125. 1873.

	Cases.	Deaths.
August	94	68
September	45	35
October	38	16
November	41	25
December	44	18
January (1872)	26	12
February	28	20
March	18	11
April	6	10
May	5	6
June	2	1
July	—	—

According to this table the number of deaths in the district of Leipzig, the population of which was 97,100, was eight in the year 1870, 1,417 (145.9 per 10,000 inhabitants) in the year 1871, and 60 in the year 1872. Accurate figures regarding the ratio of deaths to total cases cannot be computed; at all events small-pox raged very severely, owing partly to insufficient vaccination, and partly to the wretched conditions in which the working people lived.

In Dresden, mild epidemics of small-pox had raged in the year 1864 and again in the years 1867-8; between the months of January and August 1870 not a single small-pox patient was taken to the city hospital; the first case was committed to the hospital on September 27 of that year, and after that two more persons contracted the disease in a barrack. The disease spread from there, at first along the streets in the vicinity of the barrack, and then throughout the Antonstadt, Neustadt, and finally the Altstadt. The epidemic reached its climax among the civil inhabitants in April 1871, in the garrison in January. The following table indicates the number of patients committed to the city hospital in the months mentioned : ⁴⁰

⁴⁰ A. Fiedler, *Statistische Mittheilungen und aphoristische Bemerkungen über die Pockenepidemie zu Dresden in den Jahren 1870 und 1871, nach Beobachtungen im Stadtkrankenhaus daselbst. Jahresberichte der Ges. für Natur- und Heilkunde in Dresden.* 1872.

September (1870)	2	August	38
October	12	September	18
November	22	October	32
December	31	November	40
January (1871)	60	December	62
February	82	January (1872)	59
March	95	February	57
April	186	March	30
May	173	April	40
June	148	May	13
July	78	June	13

All told, there were fifteen deaths due to the disease in Dresden in the year 1870, 570 deaths (32.7 per 10,000 inhabitants) in the year 1871, and 151 deaths (8.4 per 10,000) in the year 1872. Among the prisoners there were 150 cases of the disease, and of these nine were fatal; in the garrison there were 413 cases and twenty-one deaths.

The epidemic of small-pox in Chemnitz, at least the beginning of it, was in no way connected with the war. An exhaustive report made out by Flinzer,⁴¹ who carefully investigated the conditions relative to vaccination in the year 1871, furnishes us the following figures; of 64,255 inhabitants 53,891 were vaccinated, 5,712 were unvaccinated, 4,652 had survived a previous attack of small-pox, and only 1,928 persons had been vaccinated more than once. The epidemic of small-pox began in January 1870, and reached its climax in December of that year. From March 1871 to September 1872, only a few cases of the disease were observed, but after September the number of cases suddenly began to grow larger, resulting in a second severe epidemic, which continued to increase in severity until March 1873. The mortality statistics found in Flinzer's report are reproduced below; they go only as far as April 1873, but after that the epidemic abated considerably:

⁴¹ M. Flinzer, *Die Blatternepidemie in Chemnitz und Umgegend in den Jahren 1870 und 1871. Mitteilungen des Statistischen Bureau der Stadt Chemnitz, fascicle 1. Chemnitz, 1873.*

	1870.	1871.	1872.	1873.
January . . .	1	25	3	43
February . . .	3	15	1	68
March . . .	5	4	5	74
April . . .	8	3	4	37
May . . .	8	3	6	—
June . . .	8	1	10	—
July . . .	19	—	14	—
August . . .	27	—	6	—
September . . .	20	1	6	—
October . . .	28	1	12	—
November . . .	28	1	27	—
December . . .	38	2	32	—
Total . . .	193	56	126	—

A particularly good idea of the protection against small-pox afforded by vaccination is given in the Chemnitz statistics for the years 1870-1. Of 53,891 vaccinated persons 953 (1·8 per cent) contracted the disease in those two years and seven succumbed to it, all of whom were more than ten years of age; of 5,712 unvaccinated persons, almost one-half contracted the disease (2,643 or 46·3 per cent, to be precise), and of these 243 (9·16 of those taken sick) died. Of those who died, 102 were less than one year old, 51 were less than two years old, 47 were in their fourth or fifth year, and 20 were from five to ten years of age.

How dangerous small-pox showed itself to be after the Franco-German War is indicated by a report of Geissler⁴² regarding the epidemic in Meerane, a manufacturing town of some 20,000 inhabitants. There, between October 1871 and May 1872, no less than 460 persons (434 children and 26 adults) succumbed to small-pox, i.e. 230 per 10,000 inhabitants. Of the children 80·3, and of the adults 26·3, succumbed to the disease in the course of the epidemic.

(c) *Small-pox in Bavaria in the Years 1871-2*

In the year 1866 Bavaria had an epidemic of small-pox, which, although it abated considerably in the following

⁴² A. Geissler, *Einige Bemerkungen über Pocken und Vakzination*. Arch. für Heilkunde, vol. xiii, p. 547. 1872.

years, did not leave the country entirely free from the disease ; it was, however, confined to a very few localities in the year 1870. In Upper Bavaria cases were reported in that year only in Altötting and Friedberg ; in Lower Bavaria absolutely no cases were reported ; in Upper Franconia a small epidemic raged in August 1870, in the district of Forchheim ; in Central Franconia, where in the year 1868 a rather severe epidemic had raged, the disease had almost entirely disappeared by 1870 ; Lower Franconia and Swabia, finally, had only sporadic cases of the disease. French prisoners and homeward-bound soldiers, away on furlough, caused the pestilence, as was reported from all sides, to break out anew ; the rapid dissemination of the disease, according to these reports, was helped by persons coming in direct contact with French prisoners in crowded places, by teamsters returning from France, by German fugitives from France, by persons handling the linen and clothes of patients, and by the sale of woollen blankets and other things which the French prisoners brought with them. The following table indicates the number of people who succumbed to small-pox in Bavaria : ⁴³

	Total.	Per 10,000 inhabitants.
Oct. 1, 1865-Oct. 1, 1866 . . .	577	1.2
„ 1, 1866- „ 1, 1867 . . .	1,210	2.5
„ 1, 1867- „ 1, 1868 . . .	917	1.9
„ 1, 1868- „ 1, 1869 . . .	487	1.0
„ 1, 1869- „ 1, 1870 . . .	363	0.8
„ 1, 1870-Dec. 31, 1870 . . .	224	—
1871 . . .	5,070	10.4
1872 . . .	2,992	6.1
1873 . . .	869	1.3
1874 . . .	263	0.5
1875 . . .	87	0.2

Munich fared pretty well, and the civil population suffered less than the soldiers.⁴⁴ Not a single case of small-pox occurred

⁴³ G. Mayr, *Bewegung der Bevölkerung des Kgr. Bayern im letzten Vierteljahr des Kalenderjahres 1870 und im Kalenderjahr 1871. Zeitschrift des bayr. stat. Bureau's*, vol. iv, p. 244. 1872.

⁴⁴ F. Seitz, *Krankheits- und Sterblichkeitszustand zu München im Jahr*

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there during the entire year of 1870. In November an officer suffering from dysentery returned home from France, and shortly after his arrival he was taken sick with small-pox, which later attacked two members of his family. In the first part of the year 1871 small-pox became more and more widespread, and reached its climax in June. The total number of deaths in the year 1870 was 7, in the year 1871 it was 150 (8.9 per 10,000 inhabitants), and in the year 1872 it was 108 (6.4 per 10,000 inhabitants). The following table indicates the number of deaths that occurred in the months mentioned :

November (1870)	2	October	7
December	5	November	10
January (1871)	18	December	7
February	17	January (1872)	10
March	15	February	21
April	17	March	20
May	20	April	20
June	22	May	21
July	7	June	11
August	4	July-December	5
September	6		

In Nuremberg ⁴⁵ sixteen isolated cases of small-pox were observed up to the end of September in the year 1870, and twenty cases from October to December (five in October, four in November, and eleven in December); not a single patient succumbed to the disease in the course of that year. In January the number of people to contract the disease increased rapidly, and the climax of the epidemic was reached in April. The following table indicates the number of deaths caused by the disease in the months mentioned :

1870. *Ärztl. Intelligenzblatt*, 1871. P. 414.—C. Majer, *Die Sterblichkeit in München, Nürnberg und Augsburg während der Jahre 1871 und 1872*. *Ärztl. Intelligenzblatt*, 1873. P. 677.

⁴⁵ C. Martius, *Die Blatternepidemie zu Nürnberg, 1870-2*. *Ärztl. Intelligenzblatt*, 1872. P. 689.

January (1871) . . .	1	October . . .	1
February . . .	3	November . . .	2
March . . .	10	December . . .	5
April . . .	18	January (1872) . . .	7
May . . .	13	February . . .	13
June . . .	11	March . . .	6
July . . .	6	April . . .	9
August . . .	0	May . . .	2
September . . .	3	June . . .	2

In the second half of the year 1872 there were two more deaths due to small-pox. The total number of deaths caused by the disease was 73 (8·8 per 10,000 inhabitants) in the year 1871, and 40 (4·8 per 10,000) in the year 1872.

Augsburg was very severely attacked. A Bavarian soldier and two French prisoners succumbed there to small-pox in December 1870. In January the disease spread to the civil population, increased rapidly in severity, and reached its climax in May. After abating a little in September, the epidemic started up anew and did not disappear entirely until May 1872. The number of deaths is indicated by the monthly reports found in the Bavarian *Ärztliches Intelligenzblatt*, a few of which we reproduce :

January (1871) . . .	8	October . . .	9
February . . .	14	November . . .	14
March . . .	24	December . . .	—
April . . .	35	January (1872) . . .	17
May . . .	42	February . . .	18
June . . .	34	March . . .	11
July . . .	17	April . . .	8
August . . .	14	May . . .	6
September . . .	2	June and July . . .	5

The total number of deaths, some of which are not included in the monthly lists, was 234 (45·7 per 10,000 inhabitants) in the year 1871, and 71 (13·8 per 10,000) in the year 1872.

In Regensburg sixteen persons (eleven prisoners, three soldiers, and two civilians) contracted the disease in the latter part of 1870; in 1871 as many as 123 persons contracted the disease, and of these thirty-three died. In Bamberg the first two cases were reported in December

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1870, the disease having been brought there from Würzburg; up to August 1871 some ninety persons contracted the disease, among them twenty-three prisoners and five soldiers; of these, eight died. After a short lull, new cases were reported (between December 1, 1871, and August 1872); there were thirty-one cases, all told (seventeen of the patients being soldiers), and only one death.⁴⁶

(d) *Small-pox in Württemberg in the Years 1871-2*

In Württemberg, where vaccination had been compulsory since 1818, but had been frequently evaded in the 'sixties in consequence of the agitation of the anti-vaccinationists, an epidemic of small-pox raged in the years 1863-7, causing, all told, 804 deaths. In the latter part of the year 1869 a new epidemic began and carried away many people, particularly in Stuttgart, but also in the rest of the Neckar district. With the arrival of the French prisoners the number of cases increased rapidly, and the disease appeared in many places which had never before been attacked. The following table indicates the number of reported cases and deaths:⁴⁷

Year.	Cases.	Deaths.	Deaths per 10,000 inhabitants.
1868 . .	559	34	0.2
1869 . .	1,488	133	0.7
1870 . .	5,208	529	2.9
1871 . .	10,848	2,050	11.3
1872 . .	?	1,164	6.4

But the reports were not always complete, for the reason that many cases were kept secret. The following table indicates the number of deaths caused by small-pox in the various districts:

⁴⁶ Rapp, *Ueber den Nutzen der Epidemienhäuser*. *Ärztl. Intelligenzblatt*, 1872, p. 2.

⁴⁷ G. Cless, *Impfung und Pocken in Württemberg*. Stuttgart, 1871.—Reuss, *Generalimpfbericht vom Jahre 1869*. *Württ. ärztl. Corr.-Blatt*. For 1871, vol. xli, p. 220; for 1870, vol. xlii, p. 61, 1872; for 1871, vol. xlii, p. 218. 1874.

	Neckar district.	Schwarzwald district.	Jagst district.	Donau district.
1868	1	19	3	11
1869	77	5	40	11
1870	381	71	40	37
1871	883	570	173	424

In the years 1869-70 Stuttgart⁴⁴ was the principal seat of the epidemic; sixty-six cases were reported there in 1866, fifteen cases in 1867, and seventeen cases in 1868; only one case terminated fatally in the year 1868. In the year 1869, after an average of twenty cases per month had been officially reported up to August, the disease raged more and more furiously, so that the total number of cases for the entire year was no less than 744. In the following year the disease continued to increase in severity until February, when it began to abate somewhat, so that in October 1870 only thirteen cases were reported. Then the number of cases steadily increased again until June 1871, when the epidemic once more subsided a little, only to reach another moderate climax in November. In the middle of the year 1872 the epidemic suddenly came to an end. The following table indicates the number of deaths caused by small-pox in the Stuttgart epidemic:

	1869.	1870.	1871.	1872.
January . . .	1	21	7	17
February . . .	—	19	8	14
March . . .	—	20	10	12
April . . .	2	22	25	6
May . . .	—	21	22	3
June . . .	1	14	23	3
July . . .	3	2	12	4
August . . .	2	5	15	—
September . . .	2	2	6	—
October . . .	5	1	21	—
November . . .	13	2	19	—
December . . .	21	5	19	—
Entire year . . .	50	134	187	59

⁴⁴ Sigel: *Die Mortalität in Stuttgart im Jahre 1870.*—*Württ. med. Corr.-Bl.*, 1872, p. 209. For the year 1871, p. 273; for the year 1872, vol. xliii, p. 313. 1873.

It is impossible to prove that the recrudescence of the disease in Stuttgart in the latter part of 1870 was in any way connected with the arrival of infected persons from France. In the garrison, which numbered some 3,000 men, only four mild cases occurred, inasmuch as all recruits had been vaccinated in Württemberg since the year 1833. But in the latter part of the year 1870 there arrived a battalion of the Landwehr, a third of whom had never done active service, and had therefore never been revaccinated in accordance with the military regulation; after this, numerous cases were reported in the garrison (October 1870 to April 1871), although none of them resulted fatally.

The connexion between the epidemic in the stronghold of Ulm and the war was very obvious. Says Volz:⁴⁰ 'After the summer of 1870 had produced only a few cases of small-pox, and a long pause (August to the beginning of November) had intervened, during which we saw absolutely no traces of the disease, the arrival of French prisoners caused the disease to spread far and wide, constituting a part of the epidemic which raged throughout almost all of Europe. In the latter part of September the first cases of small-pox were observed among the prisoners. But a month and a half elapsed before the disease made its appearance among the civil inhabitants; one of the first cases was traced to the beds in the barracks. In January 1871 the disease was conveyed to Söflingen by a woman from that place who had been employed as a nurse in the military hospital at New Ulm. The constant intercourse between Söflingen and Ulm soon asserted itself through the infection of working-men who were employed in the latter place and lived in the former. At the same time the disease frequently appeared among the laundry-owners, washerwomen, scrub-women, innkeepers, sutler-women, and generally among persons who were employed in any capacity in the field-hospitals and forts. Then, too, patients kept arriving who had been infected in Baden, Switzerland, Bavaria, North Germany,

⁴⁰ Volz, *op. cit.*, p. 59.

and in regions which, like ours, had been infected by prisoners and fugitives arriving from France. In the district of Beimerstetten the disease also made its appearance, having been brought there in a carpet which a woman purchased from a Bavarian soldier who had accompanied a transport of prisoners. In addition to this woman, sixteen more persons contracted the disease, and three of them died.'

In the city of Ulm thirty-six civilians (13.7 per 10,000 inhabitants) succumbed to the disease, while in the district of Ulm forty-six persons (21.2 per 10,000) died. The climax of the epidemic was reached in May; after a short lull in August and September it started up again and lasted until the autumn of 1872. The garrison at Ulm was also attacked, but not very severely.

Of the immobile troops in Württemberg, who averaged 10,122 men, 7.9 per 1,000 contracted the disease. Of the French prisoners that were held in Württemberg, 390 contracted the disease (the climax, 199 cases, was reached in December). The maximum number of prisoners was 12,958, and 30.1 per 1,000 contracted the disease and twenty-eight died (7.2 per cent of those taken sick).

In Heilbronn,⁵⁰ as in Stuttgart, a small epidemic had raged before the war broke out; from February to July 1870 some forty persons had contracted the disease. From August to October no more cases were reported, but in November a new epidemic began and spread with great rapidity. The following table indicates the number of cases and deaths in the small-pox hospital at Heilbronn:

	<i>Patients.</i>	<i>Deaths.</i>
November (1870)	2	—
December	19	2
January (1871)	51	3
February	66	9
March	95	13
April	83	14
May	95	17
June	47	11
July	18	2

⁵⁰ Höring, *Die Pocken in Heilbronn*. *Württ. med. Corr.-Bl.*, 1871, vol. xli, p. 189.

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In addition to these, twenty-seven cases of the disease were reported in the city, so that the total number of patients was perhaps as large as 1,000. All told, seventy-one persons died in Heilbronn in the course of the epidemic.

(e) *Small-pox in Baden in the Years 1871-2*

In Baden a great many cases of small-pox were reported among the French prisoners; their maximum number was 12,083, and of these 512 (42.4 per 1,000) contracted the disease, and 21 (4.1 per cent of those taken sick) succumbed to it. The largest number of cases (133) was observed in January. Regarding the distribution of the French prisoners among the various dépôts no information is available, while regarding the immobile German troops we know absolutely nothing. Among the civil inhabitants a small epidemic raged as early as the year 1869, particularly in the district of Mannheim. In the latter part of the year 1870 a considerable number of cases was reported, and a rather severe epidemic rapidly developed. According to a written report of the Baden Bureau of Statistics, the number of deaths due to small-pox per 10,000 inhabitants was as follows:

District.	1870.	1871.	1872.
Constance . . .	0.6	18.8	3.2
Freiburg im Breisgau . .	3.5	27.5	2.3
Karlsruhe . . .	3.7	33.1	5.2
Mannheim . . .	1.0	6.5	3.4
All Baden . . .	2.4	21.7	3.5

Of those cities which at that time had more than 10,000 inhabitants, Mannheim and Karlsruhe suffered very little; Rastatt, Freiburg, and Constance were the most severely attacked. The number of deaths caused by small-pox was:

	Population.	1870.	1871.	1872.
Mannheim . . .	39,606	3	33	4
Karlsruhe . . .	36,582	4	25	9
Freiburg im Breisgau . .	24,668	10	138	17
Heidelberg . . .	19,983	2	37	2
Pforzheim . . .	19,803	2	34	2
Rastatt . . .	11,560	10	99	1
Baden . . .	10,080	4	9	4
Constance . . .	10,061	2	39	3

(f) *Small-pox in Hesse in the Years 1871-2*

Regarding the epidemics of small-pox that raged in the Grand Duchy of Hesse in the course of the nineteenth century, Reissner and Neidhart⁴¹ have published an excellent book. Vaccination, at least once, was made compulsory in Hesse in the year 1807. According to the above-mentioned book, small-pox was prevalent in Hesse all the time; the average number of deaths per annum in the years 1863-8 was 0.47 per 10,000 inhabitants. After the year 1868 the statistics read as follows:

	Deaths— Total.	Per 10,000 inhabitants.
1869 . . .	20	0.24
1870 . . .	248	2.95
1871 . . .	1,028	12.08
1872 . . .	167	1.95
1873 . . .	3	0.03

The increased prevalence of the disease began in September; the following table indicates the number of deaths in the several months:

	1870.	1871.	1872.
January . . .	—	163	27
February . . .	3	148	30
March . . .	3	136	33
April . . .	9	163	35
May . . .	9	143	22
June . . .	10	105	17
July . . .	5	73	2
August . . .	5	30	1
September . . .	13	21	—
October . . .	30	15	—
November . . .	45	15	—
December . . .	116	14	—
Entire year . . .	248	1,026 ⁴²	167

While small-pox made its appearance here and there in the first half of the year 1870, it did not acquire epidemic

⁴¹ Reissner-Neidhart, *Zur Geschichte und Statistik der Menschenblattern und der Schutzpockenimpfung im Grossherzogtum Hessen. Beiträge zur Stat. des Grossh. Hessen*, vol. xxviii, fascicle 8. Darmstadt, 1888.

⁴² Two cases not datable.



dimensions until after the outbreak of the war. In many places, to be sure, it was impossible to prove that the disease was directly connected with the war. Reissner and Neidhart mention numerous cases in which the disease was communicated by field-soldiers who were sent from France to Hessian reserve-lazarets (Pfungstadt, Lampertheim, Crumstadt, and others), by furloughed field-soldiers (Lauterbach, Lorsch, Eschollbrücken, and others), by fugitives from Paris at the beginning of the war (Giessen, Gross-Eichen), by French prisoners who had contracted the disease in camp or during transport, by teamsters returning home from France (Worms, Grossgerau), by military effects—such as carpets, clothing, tent-canvas (three places in the district of Grossgerau), and especially by people who had visited the prisons where the French soldiers were confined (Mayence, Darmstadt, &c.).

Not a single district in Hesse was spared during the epidemic of the years 1870–2. The district of Mayence suffered worst of all; then came Giessen, Offenbach, and Darmstadt, all districts in which moderately large cities were located. The following table indicates the number of deaths per 10,000 inhabitants in the various cities and districts :

	1870.	1871.	1872.
Mayence (city) . . .	13·5	37·4	3·2
Mayence (district) . .	3·2	33·3	0·3
Darmstadt (city) . . .	3·5	12·9	0·8
Darmstadt (district) .	2·9	21·7	1·8
Giessen (city)	7·4	9·0	—
Giessen (district) . .	11·8	9·6	1·0
Offenbach (city) . . .	0·4	15·9	6·6
Offenbach (district) .	0·7	12·7	4·7

In the city of Mayence about thirty cases of small-pox were reported in the year 1870 before the war broke out. 'Shortly after the beginning of the war,' say Reissner and Neidhart, 'numerous prisoners were interned in Mayence, and among them cases of small-pox had not infrequently been observed beforehand. Notwithstanding the admonitions of the military physician, a barrack inside the city was set aside

as a lazaret for them. At first in the near-by streets, but later on throughout the entire city, an epidemic now began to rage such as Mayence had never before experienced in the memory of man. It lasted throughout the entire year of 1871 and did not come to an end until the middle of the following year.' The epidemic reached its climax in Mayence in January 1871, abated a little until March, started up again in April, and then slowly decreased in fury until it finally disappeared altogether. In the garrison at Mayence 190 men contracted the disease in the years 1870-2 and nine succumbed to it; of the prisoners of war 934 contracted the disease and seventeen per cent of them died. The pestilence was disseminated in all directions from Mayence, partly by people from the surrounding country who visited the city, and partly by other means. Thus, for example, the disease broke out with unusual severity in Bretzenheim, a village situated a mile or so away from the barracks where the prisoners were confined; the inhabitants of the village in many instances used the contents of the ditches in which the defecations of the prisoners were thrown to fertilize their fields, and they also bought straw and other waste products in the city.

In the city of Giessen no cases of small-pox occurred in the year 1870 prior to the outbreak of the war. The first cases observed there were in September, but the epidemic, which reached its climax in December, did not become very widespread. In Darmstadt 50 cases of small-pox were reported in the year 1870 prior to the outbreak of the war, and after the war began some 50-60 cases were observed before the end of the year. The epidemic, which became only moderately widespread, lasted throughout the entire year of 1871 and did not disappear until the middle of the year 1872.

(g) *General Observations regarding the Epidemic of Small-pox in Germany in the Years 1871-2*

In connexion with the Franco-German War an epidemic of small-pox raged throughout Germany, the extent and virulence of which exceeded that of any other epidemic that occurred in the entire course of the nineteenth century. Unfortunately, in the case of a number of small States, we have no statistics relating to the number of deaths caused by the disease. The figures which I was able to obtain I have compiled in the following table. In the case of Alsace and Lorraine, as well as of Oldenburg, the two Mecklenburgs, and the other small North German States, absolutely no figures are available; judging by their population and by the prevalence of small-pox in the States surrounding them, we may safely estimate the number of deaths caused by small-pox in them in the years 1871-2 at some 4,000.

<i>States in the German Confederation.</i>	<i>Population Dec. 1, 1871.</i>	<i>Deaths caused by small-pox.</i>				
		1869.	1870.	1871.	1872.	1873.
Prussia . . .	24,691,085	4,655	4,200	59,839	66,660	8,932
Bavaria . . .	4,863,450	4,56 ⁸⁴	516 ⁸⁴	5,070	2,992	869
Saxony . . .	2,556,244	?	?	9,935	5,863	1,772
Württemberg .	1,818,539	133	529	2,050	1,164	55
Baden ⁸⁸ . . .	1,461,562	67	343	3,176	511	?
Hesse . . .	852,894	20	248	1,028	167	3
Brunswick ⁸⁸ .	312,170	?	2	269	215	?
Lübeck . . .	52,158	—	1	36	15	—
Bremen ⁸⁸ . .	122,402	—	—	54	41	3
Hamburg . . .	338,974	20	83	3,647	323	3
Other States .	2,439,576	?	?	4,000 ⁸⁴	4,000 ⁸⁴	?
Alsace-Lorraine	1,549,738	?	?	?	?	?
All Germany .	41,058,792	—	—	89,104	81,951	—

The above compilation leaves no doubt that the disease was borne into Germany from France. The contagion was conveyed into Germany by prisoners and field-soldiers, some

⁸⁸ According to MS. reports.⁸⁴ Estimate.

of whom were infected beforehand and were sick when they got there, others of whom were still apparently healthy, and still others of whom had reached the convalescent stage of the disease, and less frequently by civil persons (teamsters and fugitives); but the prisoners were by far the most active influence in spreading the disease. The dissemination usually took place in the following manner; in the dépôts where the prisoners were confined, small-pox epidemics of varying severity broke out; from all sides the people streamed in to see the prisoners, and when they went away they conveyed the infection wherever they went, at first, of course, around in the immediate vicinity. This is most evident in the eastern provinces, where these dépôts soon came to be dangerous seats of small-pox infection; the nearby districts were very severely attacked as early as the year 1871, whereas the more remote districts did not begin to suffer severely until the year 1872.

The development of a small trade between the prisoners and civil inhabitants in articles belonging to dead soldiers, or in personal effects, also helped to spread the disease; moreover, certain unscrupulous sick-attendants, when they were instructed to destroy such articles, frequently disobeyed the order and secretly sold them, thereby giving an additional impetus to the dissemination of the disease.

The fact that a large part of the population was not vaccinated, and that the necessity of revaccination was not properly recognized (only soldiers were revaccinated), also helped to increase the severity of the pestilence. In all the South German States compulsory vaccination had existed for decades, but its strict enforcement was everywhere hindered by the activity of the anti-vaccinationists; Prussia and Saxony did not introduce compulsory vaccination until the year 1874. Revaccination among the civil inhabitants was rarely practised in either North or South Germany. These differences in the vaccination laws account for the fact that small-pox raged more severely in North Germany than

in South Germany ; this is also distinctly shown by the tables reproduced in the course of this chapter. The fact that the civil inhabitants in general were more thoroughly vaccinated also explains why the percentage of children that succumbed to small-pox was so much smaller in South Germany than in North Germany.

The number of deaths caused by small-pox in the epidemic of the years 1870-2 was greatly increased by the extremely virulent character of the disease. Of course one cannot estimate the number of deaths caused by small-pox among the civil inhabitants from the number of reported cases of the disease, since the reports sent in were always very incomplete. We know that the mortality of small-pox depends very much upon vaccination ; vaccinated persons succumb far less frequently to the disease than unvaccinated persons. This fact explains why among the German field-soldiers, who were constantly subjected to hardships and privations of all kinds, only 5.75 per cent of the patients died, whereas of the French prisoners some 13.85 per cent died. The mortality among the civil inhabitants of Germany was also very high ; this was chiefly due to the fact that severe forms of the disease, particularly hemorrhagic small-pox, were of frequent occurrence. As authority for this we can only refer to these reports of the hospitals ; but since small children, amongst whom the mortality of small-pox is very high, are less represented in them, and, on the other hand, since mild cases among adults can more readily be withdrawn from hospital treatment, one cannot accept without qualification the experience of the hospitals. According to Wunderlich, of 681 patients treated in the Leipzig hospital between the year 1852 and July 1870, only 29 (4.2 per cent) died, whereas in the years 1870-1, of 1,727 patients treated, 253 (14.7 per cent) died. In Breslau, whereas in former epidemics an average of seven per cent of the patients died, in the epidemic of the years 1871-2 no less than 13.4 per cent died. Guttstadt also states that the mortality in the Berlin hospitals was

fifteen per cent, whereas the number of deaths caused by the disease in former years was much smaller. We have seen above that 21.7 per cent of the patients taken to the Hôtel-Dieu in Lyons died. It is unnecessary to adduce further statistics; all contemporary observers agreed that the epidemic involved an extremely severe and virulent form of the disease, and that this same virulence characterized the disease wherever it made its appearance.

5. *The Epidemics of Small-pox that raged in the European, and in a few of the non-European States in connexion with the Franco-German War of 1870-1*

(a) *Switzerland*

Switzerland was exposed to great danger in consequence of the passage of General Bourbaki's army, which consisted partly of very young soldiers who had suffered great hardships, including cold and hunger, and which contained large numbers of men who were suffering from small-pox. The little country was called upon to take in some 85,000 men; when the latter were examined on the frontier a large number of them were found to be infected with small-pox and were held at Verrière in France. But this did not prevent the disease from being conveyed across the border. Of the French prisoners confined there, 137, all told, succumbed to small-pox.

Unfortunately no mortality statistics giving the cause of death were compiled in Switzerland until the year 1876, so that we have no figures indicating the prevalence of small-pox. The western cantons were most exposed to the infection. In Berne, which at that time had a population of 506,511, no less than 2,637 persons, excluding the French prisoners interned there, contracted the disease between October 1870 and September 1872; in the year 1871 there were 9.6 deaths per 10,000 inhabitants.⁵⁵ In the city of Basel, which was

⁵⁵ A. Vogt, *Die Pockenseuche und Impfverhältnisse in der Schweiz*. Berne, 1882.

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attacked as early as November 1870, the epidemic reached its climax in February; the number of deaths there was as follows: ⁵⁶

	Total no.	Per 10,000 inhabitants.
1870	7	1.6
1871	64	14.0
1872	13	2.7

The Canton of Basel (Land) was attacked somewhat less severely; in the year 1871 only 59 persons (10.9 per 10,000 inhabitants) succumbed there to small-pox. In the Canton of Solothurn, which was infected from Birmensteden, a railway junction, 13.9 persons per 10,000 inhabitants died in the year 1871. In the Canton of Waadt small-pox broke out, according to Vogt, in the district of Vivis in November 1870, and 200 persons contracted the disease in the course of that month. In the two small-pox hospitals at Lausanne, 35 patients were treated between November 20, 1870, and the end of 1871, and 62 of them died.

The small-pox epidemic spread very rapidly from the West throughout all the rest of Switzerland, partly in consequence of the distribution of the French prisoners among the other cantons, and partly in consequence of inland intercourse. Of the French prisoners interned in the Canton of Zurich 180, according to A. Brunner,⁵⁷ contracted the disease and 31 died of it. The patients were sheltered in the small-pox camp at Wintertthur, whence the infection spread to many places. In February 1871 there was a rapid increase in the number of cases; the epidemic reached its climax in March and April, and then steadily abated until June. The statistics for the Canton of Zurich, which had a population of 285,915, were as follows:

⁵⁶ A. Burckhardt, *Demographie und Epidemiologie in der Stadt Basel, 1601-1900*. Leipzig, 1908. P. 105.

⁵⁷ A. Brunner, *Die Pocken im Kanton Zürich*. Zurich, 1873.—S. Rabino-witsch-Tonkonogowa, *Über das Vorkommen der Pocken im Kanton Zürich im 19. Jahrhundert*. Karlsruhe, 1903.

	<i>Patients.</i>	<i>Deaths.</i>
1870	85	6
1871	1,068	137
1872	200	18
1873	22	—

In the Canton of Thurgau, according to Vogt, there were 9.2 deaths per 10,000 inhabitants in the year 1871, in the Canton of Schaffhausen 4.0, and in the Canton of St. Gall 3.3. During the small-pox epidemic that raged in the Canton of Schwyz in the year 1871 the communities of Gersau and Küssnacht were severely attacked; throughout the entire canton 56 persons (11.7 per 10,000 inhabitants) succumbed to the disease. The Cantons of Glarus, Unterwalden, Zug, and Graubünden were also rather severely attacked. In the Canton of Tessin, whither the disease, which first appeared in Locarno, had been conveyed by travellers from Paris, and where 62 cases of it and 6 deaths had been reported up to June, a new epidemic broke out in Personico, resulting in 15 deaths; in the year 1871 there were 11 deaths reported throughout the entire canton. In the Canton of Willis small-pox broke out only sporadically.

(b) *Belgium*

In numerous places throughout Belgium small-pox had appeared in the first part of the year 1870 in the form of widespread epidemics, a fact which we can readily explain when we consider the country's proximity to France, which was everywhere infected with the disease. Thus, according to Larondelle, a severe epidemic of small-pox broke out in February 1870, in the city of Verviers, which at that time had some 33,000 inhabitants, and lasted until January 1871; in the year 1870 no less than 428 deaths were reported there, and 185 of them occurred in the month of December alone. When the war began French fugitives kept bringing the disease into the country, especially after the battle of Sedan, when more than 10,000 French soldiers were interned on

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Belgian soil, some in Beverloo and others in the citadel of Antwerp. From these places the epidemic spread throughout all Belgium. In Brussels, for example, no cases of small-pox were reported in July 1870, in August there were two cases, in September two, in October twenty-two, in November sixty-nine, and in December 101. In all Belgium the number of deaths caused by small-pox was :⁶⁶

		Total no. deaths.	Per 10,000 inhabitants.
1868	. . . .	843	1.7
1869	. . . .	1,651	3.3
1870	. . . .	4,163	8.2
1871	. . . .	21,315	41.7
1872	. . . .	8,704	16.8
1873	. . . .	1,749	3.3

(c) Netherlands

In the Netherlands an epidemic of small-pox had raged in the year 1866; in the following year it had rapidly abated, and in the year 1869 had caused only fifty deaths in the three provinces of North Holland, Utrecht, and Limburg combined. In the year 1870 the number of deaths increased considerably, and in the following year reached an appalling height.⁶⁷ The following table indicates the annual mortality of the disease :

		Total no. deaths.	Per 10,000 inhabitants.
1869	. . . .	50	0.14
1870	. . . .	706	1.96
1871	. . . .	15,787	43.55
1872	. . . .	3,731	10.21
1873	. . . .	351	0.95

Thus both Belgium and the Netherlands had a very high small-pox mortality in the year 1871; as elsewhere, the cause is traceable to repeated transplantations of the disease, and to the fact that vaccination was insufficiently practised.

⁶⁶ L. March, *Statistique internationale du mouvement de la population*. Paris, 1907.

⁶⁷ *De Pokkenepidemie in Nederland in 1870-3*. Hague, 1875. Quoted from Th. Lotz, *Pocken und Vakzination*. Basel, 1880.

(d) *Austria*

In the years 1872-4 Austria suffered severely from small-pox; the total number of deaths per annum caused by the disease is indicated by the following table: ⁶⁰

	<i>Total no. deaths.</i>	<i>Per 10,000 inhabitants.</i>
1870	6,177	3.0
1871	8,074	3.9
1872	39,368	19.0
1873	65,274	31.2
1874	36,442	17.3
1875	12,151	5.7

Although small-pox was usually conveyed into Austria from the East and South (Italy), nevertheless the connexion between the epidemic in Austria of the years 1872-4, and the great German epidemic is too obvious to be overlooked. This is clearly shown by the successive appearances of the disease in the various crown-lands, the number of deaths per 10,000 inhabitants in which is indicated by the following table:

	1870.	1871.	1872.	1873.	1874.	1875.
Lower Austria . .	2.6	5.1	37.0	28.8	15.1	10.6
Upper Austria . .	1.4	2.5	12.6	19.8	7.4	3.1
Salzburg	4.1	9.8	20.4	18.6	3.1	0.7
Styria	1.3	1.7	7.0	15.1	22.4	8.0
Carinthia	2.6	1.9	2.7	18.3	27.8	5.6
Carniola	1.2	1.2	4.0	21.2	51.1	4.3
Triest		2.1	72.2	4.1	5.9	2.7
Görz and Gradiska	3.2	1.1	5.5	7.6	5.2	1.4
Istria		0.6	18.3	9.5	8.9	3.0
Tyrol		1.1	1.0	3.3	11.0	14.4
Vorarlberg	0.9	1.7	7.2	12.9	3.2	0.7
Bohemia	1.1	1.8	15.7	29.0	4.0	1.0
Moravia	1.8	3.8	21.0	47.0	6.6	2.4
Silesia	0.2	3.6	57.7	25.2	4.7	1.3
Galicia	6.4	6.4	20.9	46.5	33.5	7.3
Bukowina	6.6	12.0	9.0	9.7	44.3	29.2
Dalmatia	4.4	3.6	3.0	9.4	5.8	3.5

These relative percentages were based upon a mean population computed from two censuses, one taken in 1869 and the other in 1880.

⁶⁰ J. Daimer, *Todesursachen in Oesterreich während der Jahre 1873-1900. Das österreichische Sanitätswesen, 1902.* Supplement to No. 87, p. 104.

We see how the epidemic gradually penetrated into Austria, and how Triest at a very early date became a second focus of the dissemination. In the year 1870 the small-pox mortality was generally low in Austria. The small epidemic in Bukowina in the year 1871 had no causal connexion with the Franco-German War; it was an epidemic such as had often broken out in former years in the countries of eastern Austria, and such as still break out occasionally nowadays. On the other hand, a considerable increase in the number of deaths caused by small-pox is observed in the year 1871 in Lower Austria and Salzburg, and to a certain extent in East Austria, Moravia, Silesia, and Bohemia; in Lower Austria, Salzburg, and Silesia the epidemic reached its climax in the year 1872, whereas in Upper Austria, Bohemia, and Moravia this climax did not come until the year 1873. The same is true of Vorarlberg, while the crown-lands of Styria, Carinthia, Carniola, and Tyrol were most severely attacked by the disease in 1874. In Triest and Istria the climax of the epidemic was reached in 1872, in Görz and Gradiska in 1873. In Galicia, which had always had a high small-pox mortality, the epidemic did not begin until the year 1872; it reached its climax in the following year. In Bukowina the climax did not come until the year 1874.

'To follow the progress of the disease according to political districts,' says Daimer, 'is instructive for the reason that, as was clearly shown at that time, it always spread slowly—a fact which was also repeatedly observed in the case of other epidemics; thus, there was always time enough to adopt appropriate measures aiming to check its progress.' There is a very marked difference between the epidemic of small-pox in East Austria and the one in Germany; the latter attacked all Germany within a short time, since the war had developed there a very extensive intercourse. And even in Germany it was observed that the disease was a long time in reaching those regions that were less affected by this intercourse.

Vienna was attacked with great severity by small-pox ; so also was Prague, though to a lesser extent. The following table indicates the number of deaths caused by the disease per 10,000 inhabitants :

					<i>Vienna.</i>	<i>Prague.</i>
1869	.	.	.	.	5.4	1.9
1870	.	.	.	.	4.8	2.6
1871	.	.	.	.	7.6	1.5
1872	.	.	.	.	52.7	39.7
1873	.	.	.	.	22.0	28.2
1874	.	.	.	.	14.3	3.0
1875	.	.	.	.	18.0	1.1

But in these cities the epidemic did not come to an end ; epidemic outbreaks of small-pox continued to occur in Vienna until 1885, in Prague until 1893, and in a number of years (for example, 1877, 1880, 1883, 1884, and 1888) the disease underwent some very important exacerbations.

(c) *Italy*

Small-pox is supposed to have been conveyed into Italy by the volunteers who had fought under Garibaldi ; they became infected with the disease in the Department of Côte d'Or, where it had raged extensively, and then brought it back with them when they returned home. In Milan 200-300 cases per annum were usually reported prior to the year 1870. In the summer of that year the number of cases greatly increased, terminating in the following year in a severe epidemic which reached its climax in September and October. According to Felice del Agua,^a there were 1,287 cases and 152 deaths in the year 1870, and 2,407 cases and 866 deaths in the year 1871. In Rome small-pox made its appearance in October 1871, causing 335 deaths between October 10 and December 31, 1871, and 727 deaths in the entire year of 1872. In the case of a large number of individual places we have reports regarding epidemics of small-pox, but I was

^a Felice del Agua, *Cenni sul vaiuolo e sulla vaccinazione*. Quoted from Virchow-Hirsch, *Jahresbericht über die Leistungen und Fortschritte in der ges. Med. für 1872*. Vol. ii, p. 267. For 1873, vol. i, p. 810.

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unable to find a comprehensive account of the epidemic that raged at that time in Italy.

(f) *Great Britain and Ireland*

Owing to the constant intercourse between England and France it was inevitable that small-pox should very soon be conveyed into England; the persons who conveyed it were probably French refugees. As on the continent, so also in England, small-pox was always prevalent; in the years 1869 and 1870, however, it was not very widespread, and it did not begin to gain much headway until the autumn of 1870. The number of deaths caused by small-pox in England was :

		<i>All told.</i>	<i>Per 10,000 inhabitants.</i>
1868	. . . .	2,052	0·9
1869	. . . .	1,565	0·7
1870	. . . .	2,620	1·2
1871	. . . .	23,126	10·1
1872	. . . .	19,094	8·3
1873	. . . .	2,264	1·0

In the first nine months of the year 1870 there was no increase in the small-pox mortality, but in the last three months, and from January 1871 on, the increase was very marked. The number of deaths caused by the disease was :

		1870.	1871.
First quarter	. . . .	405	4,903
Second	„	446	7,012
Third	„	500	4,612
Fourth	„	1,229	6,380

These figures do not agree with the figures for the years 1870-1 given in the previous table, and the reason for this is not explained in the report. The places where the disease first entered England were London, Liverpool, and the mining districts of Durham and South Wales (Monmouth). The compiler of the reports regarding the movement of the population in England in the year 1871 says :²² ' Nearly all

²² Thirty-fourth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales. London, 1878. P. xxxi.

the smaller outbreaks may be more or less directly traced to one of these centres; Brighton, for instance, doubtless suffered from its intimate communication with London. There is distinct evidence in many cases of the introduction of the disease into sea-side towns by sailors, and considering its fatal prevalence in Holland, Belgium, and many parts of France, it is not a matter for great surprise that Southampton, Great Grimsby, and one or two other ports suffered from the epidemic. It is indeed very probable that the epidemic in London was due to the large arrivals of French refugees during the latter part of the previous autumn. That the epidemic may to a great extent be traced to our foreign communications is beyond doubt, and it is to be regretted that the steady decline of deaths from small-pox in the six years 1864-9 had induced a certain apathy in the matter of vaccination, and thus left a large portion of the population unprotected from the disease. In times of severe epidemics large numbers of the vaccinated in some way or other also suffer for the neglect which has left so many unvaccinated.'

The number of deaths caused by small-pox in London was :

					<i>Total no.</i>	<i>Per 10,000 inhabitants.</i>
1868	.	.	.	.	597	1.9
1869	.	.	.	.	275	0.9
1870	.	.	.	.	973	3.0
1871	.	.	.	.	7,912	24.2
1872	.	.	.	.	1,786	5.4
1873	.	.	.	.	113	0.3

In the first quarter of the year 1871 some 2,400 persons succumbed to small-pox in London, in the second quarter 3,241, in the third quarter 1,255, and in the fourth quarter 980. The epidemic broke out in the East End of London in the fortieth week of the year 1870, i.e. in the first part of October; the number of deaths caused by it there was 40, and by the end of the year this number had increased to 110.

Of the English counties, those along the north-east coast were most severely attacked; for example, Durham and

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Northumberland, where the number of deaths caused by the disease was 45.0 and 29.8, respectively, per 10,000 inhabitants. In the cities of Sunderland and Newcastle-on-Tyne, located in these counties, the number of deaths per 10,000 inhabitants in the year 1871 was 86.0 and 54.1 respectively. There was a very large number of deaths in London (24.2 per 10,000 inhabitants), and the counties bordering on London (Middlesex and Essex) also suffered severely (9.3 and 8.0 respectively); next in order come the counties of Monmouthshire and Lancashire with 14.8 and 11.9 respectively. The high mortality in Lancashire was due only to the city of Lancaster, where there were no less than 38.8 deaths per 10,000 inhabitants; in the rest of the county the number of deaths per 10,000 inhabitants was only 6.3.

In Scotland and Ireland the number of deaths caused by small-pox was :

	<i>All told.</i>		<i>Per 10,000 inhabitants.</i>	
	<i>Scotland.</i>	<i>Ireland.</i>	<i>Scotland.</i>	<i>Ireland.</i>
1869 . . .	64	20	0.2	0.04
1870 . . .	114	32	0.3	0.1
1871 . . .	1,442	665	4.3	1.2
1872 . . .	2,448	3,248	7.2	6.2
1873 . . .	1,126	504	3.3	0.9
1874 . . .	1,246	569	3.6	1.1
1875 . . .	76	535	0.2	1.0

Small-pox spread very slowly to Scotland and Ireland; whereas in England the maximum number of persons died in the year 1871, in Scotland and Ireland the maximum number of deaths occurred in the year 1872. Both countries, moreover, were less severely attacked than England.

(g) *Denmark, Norway, Sweden, Finland, and Russia*

Small-pox was a long time in spreading to the Scandinavian countries. In Denmark an epidemic had raged in the year 1869, but did not become very widespread until the year 1872. In Copenhagen it began in the year 1871 and reached its climax in February 1872; between January and April 1,220 cases of the disease and 86 deaths were reported there.

Regarding Norway we have no statistical information. In Sweden small-pox raged in the years 1865-9, abated a little in the years 1871-2, and started up again with considerable severity in the year 1873. Stockholm was severely attacked; in the year 1873 there were 13.0 deaths per 10,000 inhabitants, and in the following year 79.2. In Finland, where an epidemic had raged in the year 1868, the number of deaths caused by the disease began to increase in the year 1872, and in the two following years the epidemic acquired enormous dimensions. The number of deaths per 10,000 inhabitants was:

				Denmark. ⁸³	Sweden. ⁸⁴	Finland. ⁸⁵
1870	.	.	.	1.0	1.8	1.3
1871	.	.	.	0.6	0.8	1.0
1872	.	.	.	2.2	0.8	3.4
1873	.	.	.	0.3	2.6	45.6
1874	.	.	.	0.4	9.4	50.1
1875	.	.	.	2.1	4.6	8.6
1876	.	.	.	0.1	1.4	3.6

L. Colin reports that the pestilence spread to Russia in the year 1872, when it attacked St. Petersburg very severely. More detailed information I was unable to find.

(h) *Non-European Countries*

Constant emigration to America caused the disease to make its appearance there, and it gradually spread over the entire continent. The following table indicates the number of deaths caused by it in the states of Michigan and Massachusetts: ⁸⁶

				Massachusetts.	Michigan.
1870	.	.	.	131	11
1871	.	.	.	294	75
1872	.	.	.	1,029	304
1873	.	.	.	668	93
1874	.	.	.	26	19

In New York 109 persons succumbed to small-pox in the year 1869, 293 in 1870, and 805 in 1871.

⁸³ *Befolkningsforholdene i Danmark i det 19. Aarhundrede.* Copenhagen, 1905. P. 147.

The disease was also conveyed to the West Indies and to Chile. Lersch,⁶⁴ moreover, reports that severe epidemics of small-pox occurred in the Sandwich Islands and in Borneo, and that 500,000 persons succumbed to it in the years 1873-5 in British India. But inasmuch as small-pox frequently breaks out there in the form of large epidemics, it cannot be assumed that the epidemic in Europe exerted any influence upon this outbreak.

6. *The Age of the Small-pox Patients. The Connexion between the Epidemic and the War. The German Imperial Vaccination Law*

Thus far very little attention has been called to the fact that the age of the persons who succumbed to small-pox varied greatly in the different countries. This depends upon how well vaccinated the population of the country or countries was. Formerly, when nobody was ever vaccinated, the first year of life and the following years were by far the most seriously threatened; after the first few years the mortality of small-pox gradually decreased as the age of the patients increased. This also applies to-day to those countries in which vaccination is neglected. On the other hand, in those countries in which children are vaccinated in the first year of their lives, the infant mortality is low, although the same children lose their immunity to the disease when they grow older. To illuminate these facts let us adduce a few figures. In estimating the number of deaths, however, we cannot use the number of the living as a relative basis to work on, since the prevalence of small-pox varied greatly in the different countries; consequently we must take the total number of deaths and estimate the mortality on the basis of age from that alone. But in doing this we can compare with one another only entire countries in which the various ages are all about equally represented; if we were to take smaller units, for example, city and country, or agrarian and indus-

⁶⁴ B. M. Lersch, op. cit., p. 437 f.

trial districts, and use them for a basis of comparison, more detailed computations would be necessary. Of the four states included in the table below, Bavaria and Hesse introduced compulsory vaccination (the law required everybody to be vaccinated at least once) in the year 1807; Saxony and the Netherlands, on the other hand, did not have compulsory vaccination. Of every 100 persons who died of small-pox the following table indicates the relative proportion on the basis of age:

	<i>Vaccination compulsory.</i>		<i>Vaccination not compulsory.</i>	
	<i>Bavaria.</i> (1870-5).	<i>Hesse.</i> (1870-2).	<i>Saxony.</i> (1872).	<i>Netherlands.</i> (1870-3).
0-20 years old	22.4	21.8	76.3	68.3
20-60 " "	59.0	65.4	21.9	29.6
Over 60 " "	18.6	12.8	1.8	2.1

This table clearly shows that vaccination protects a person against contracting small-pox for a number of years, or at least against succumbing to it, but that this immunity lasts only for a certain length of time and should be prolonged by revaccination—a fact which the Prussian military authorities recognized and took into practical consideration for many decades prior to the year 1870.

Many have contended that the epidemic of small-pox which ravaged a large part of Europe, from the year 1870 on, was not a consequence of the Franco-German War, but an independent outcome of unknown conditions that were particularly favourable to the dissemination of the disease. The main argument used to uphold this contention is that epidemics of small-pox had occurred in all the states in the years before the war, without having gained such irresistible headway, and that the disease had broken out in the form of epidemics in many parts of Germany and the neighbouring countries even in the first half of the year 1870. But to refute this argument it can be clearly shown through Guttstadt's instructive compilation of data that the German epidemic was in countless instances, in the case of Prussia as well as in that of other states in the German Confederation,

brought about by the transplantation of the disease from France. Whenever small-pox broke out anywhere in times of peace, it was possible to keep the disease localized, through isolation of patients and the vaccination of the inhabitants of all regions in which fugitives from pestilence took refuge. In the year 1870, on the other hand, the contagion of small-pox was spread throughout all Germany in a few months; the increased intercourse caused by the war, together with the habit the Germans had of visiting the prisons where the French soldiers were confined, also helped to spread the disease in all directions.

For Germany this disastrous epidemic, which throughout the German Empire, including the Imperial Provinces, carried away upwards of 170,000 persons, had just one good result—it led to the passing of a law in the year 1874 which rendered vaccination compulsory. ‘ Besides taking thousands of human lives the epidemic also caused considerable economic loss; the care of the sick and the measures adopted to prevent the disease from spreading necessitated large expenditures of money, while large numbers of working-men contracted the disease and were thus incapacitated for a long time; furthermore, the disease left unnumberable sickly people, who had to be further supported, and at the same time the fear of infection interfered with commercial intercourse. Those who managed to escape infection, or to recover from an attack of the disease, naturally wished to run no more risks in the future, or to expose the welfare of their families to danger or destruction.’⁶⁵

In consequence of all this grave suffering, the representatives of the people petitioned the Imperial Government to provide as soon as possible for a uniform legislative regulation, making universal vaccination compulsory. The desire expressed in this petition was soon fulfilled by the submission of a bill on February 5, 1874; the bill was passed by the

⁶⁵ *Blattern und Schutzpockenimpfung*. Elaborated in the Kaiserl. Gesundheitsamt. Second edition, 1896. P. 75 f.

Reichstag on March 14, and received the signature of the Kaiser on April 8, 1874. This law required all persons to be vaccinated in the first year of their lives, and to be re-vaccinated in their twelfth year; it applied generally to all Germany.

The beneficial result of the passing of this law was clearly demonstrated in the course of the following decades. Notwithstanding the fact that Germany is almost entirely surrounded by states in which epidemics of small-pox, in consequence of insufficient vaccination, are of frequent occurrence, since the passing of the Imperial Vaccination Law the disease has not once made its appearance on German soil in the form of a widespread epidemic. Despite the fact that small-pox is frequently conveyed into the country, especially by foreign working-men, the efforts to keep it confined within narrow limits have always been successful. The measures which are so effective in the case of other diseases—isolation of the patients and of suspected persons living in the vicinity, disinfection of the room and effects which have been used by patients—in an insufficiently vaccinated community do not have the desired rapid success, since the contagion of small-pox clings with extraordinary tenacity to clothes and articles of general use. This fact has been abundantly proved in the epidemics of small-pox that have occurred in Europe in the course of the last few decades.

CHAPTER IX

FROM THE FRANCO-GERMAN WAR TO THE PRESENT TIME

AMONG the great advances made in the last few decades of the nineteenth century must be included the successful battle of modern hygiene against infectious diseases. This struggle was introduced by the development of practical hygiene in England and by the perfection of scientific hygiene through the work of Pettenkofer. But a firm basis on which to combat pestilence was not secured until the brilliant discoveries of Koch and his successors pointed out to us the cause of these pestilences, and methods were found to demonstrate in a short time the presence of disease-germs, even among persons who become ill but slightly, or not at all, and who for that reason are very dangerous to those about them.

Since even in time of peace the close quarters in which soldiers live in barracks greatly favour the outbreak of epidemics, the military authorities constantly watched and profited by these advances in the field of disease-prevention; and with the success of efforts to decrease the prevalence of infectious diseases among the soldiers in time of peace, so also in war-times it became possible to check more thoroughly than ever before the dissemination of these diseases. Hence the number of men carried away by epidemics is much smaller in modern wars than used to be the case.

1. THE RUSSO-TURKISH WAR OF 1877-8¹

The Russo-Turkish War of 1877-8, like all former wars with

¹ N. Kosloff, *Kriegssanitätsbericht über den Krieg gegen die Türkei, 1877-8.*

Turkey, was characterized by severe pestilences, which at both seats of the war, the European as well as the Asiatic, were responsible for large numbers of deaths. Typhus fever, which frequently made its appearance in Russia and in the Balkan Peninsula, was once more the disease which made the greatest havoc. In the years preceding the war it had raged in the form of epidemics in several Russian Governments, and it is probable that the Russian army was already infected with it. Erisman states that cases of typhus fever were observed among the soldiers in the thirty-fifth infantry division when it was being assembled in the Government of Kiev; the disease also revealed its presence among the troops when they were mustered at Kishinev (Bessarabia) before the war broke out. In April and May 1877, when the army was advancing toward the Danube under a steady downpour of rain, the number of sufferers from typhus fever, intermittent fever, and dysentery increased considerably. During the siege of Plevna, which lasted 143 days and terminated in the capitulation of the city on December 10, 1877, the prevalence of disease increased still more. The march across the Balkan Peninsula in the winter of 1877-8 made great demands upon the badly nourished Russian troops. The better conditions anticipated in the Balkan lowlands did not show themselves; on the contrary, here began, from the standpoint of sanitation, the most unfortunate part of the campaign, since the retreating Turks had devastated the entire country. The number of typhus-fever patients in the Russian army, which numbered some 411,000 men, increased to 18,049 in the month of February 1878, and of these 7,522 had spotted fever and 1,540 died. The pestilence continued to rage with unbroken severity until May; in June it began to abate.

St. Petersburg, 1884-6; P. Myrdacz, *Sanitäts-geschichte des Russisch-türkischen Kriegs (1877-8) in Bulgarien und Armenien*. Vienna, 1898; Knaak, *Die Krankheiten im Kriege*. Leipzig, 1900. P. 65.

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The total number of fever-patients and deaths in the Russian army during its march to the Danube is indicated by the following table :

	<i>Patients.</i>	<i>Deaths.</i>
Typhoid fever . . .	25,088	7,207
Gastric fever . . .	38,363	1,615
Typhus fever . . .	32,451	10,081
Relapsing fever . . .	39,337	4,849

The number of men in the army increased from 217,446 in April 1877, to 418,000 in March 1878.

The military lazarets played an important and disastrous rôle in the dissemination of typhus fever, just as they had done in the Napoleonic Wars. 'The lazaret-system adopted by the Roumanians', says Niedner,² 'proved utterly inadequate for the Russians. Scarcely a third of the regular division-hospitals and military hospitals were made mobile, and their number, as well as their equipment, was insufficient. The lazarets were supervised by the Hospital Department, and consequently lacked all medical management and were always missing wherever they were needed. The few available lazarets were overcrowded, and being full of dirt and refuse they merely constituted an added danger for the patients and for the inhabitants. Not until after long delay were additional barracks constructed, and these were so badly arranged that they offered very little relief from the condition of overcrowding in the hospitals. Above all, there was a lack of means for disinfection and of clean linen, and this rendered it inevitable that large quantities of infectious material should accumulate in the lazarets, and that convalescents discharged from these hospitals should be more likely to infect other people with whom they came in contact along the military roads.' The transporting of these convalescents back to Russia began in the first part of the campaign; they not only spread the disease all along the

² O. Niedner, *op. cit.*, p. 90.

military roads, but large numbers of them conveyed it back to Russia itself, where it appeared in countless localities and soon developed into a widespread epidemic of typhus fever. At the end of the campaign, to be sure, conditions improved; in the spring of the year 1878 a commission appointed for the purpose finally succeeded in establishing certain rules governing sanitation in the lazarets, and in bringing it about that typhus fever patients were everywhere isolated. When the war was over the troops were transported back home across the Black Sea, along the coast of which, in the ports of Réni, Nikolayev, Sebastopol, and Odessa, health-committees had been appointed to see to it that the sick soldiers were congregated by themselves.

Typhoid and typhus fever likewise became very widespread in the Caucasian army. According to Kosloff, typhus fever was not endemic in Armenia, as was probably the case with typhoid fever; the Russian physicians think that it was conveyed thither by the Russians themselves and not by the Turks. The conditions for quartering the Russian troops were as unfavourable as one could possibly imagine; they were housed in dirty Armenian villages, where nobody attended to the removal of refuse, and were badly provisioned and inadequately supplied with clothing; this, coupled with continuous marching and fighting, greatly reduced their power of resistance. In October 1877 the main army was infected with typhus fever, and the overcrowded hospitals merely helped to spread the disease. Conditions were worst of all in the detachment in Erivan. After the troops had gone into winter quarters there, typhus fever broke out with terrible severity and presently the entire government of Erivan was suffering from the pestilence; particularly hard hit were the cities of Erivan, Chorassan, &c., where the troops were very numerous and were exposed to the ravages of the pestilence. The following table indicates the number of men in the Caucasian army that contracted and succumbed to the four diseases mentioned:

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	<i>Patients.</i>	<i>Deaths.</i>
Typhoid fever . . .	24,473	8,908
Gastric fever . . .	9,589	1,044
Typhus fever . . .	15,660	6,506
Relapsing fever . . .	14,576	3,775

The inhabitants of those regions in Asia in which fighting took place were not attacked by typhus fever. The Turkish troops, on the other hand, suffered severely from the disease, though not so severely as the Russian troops; the reason for this was that the former were better nourished and their camps were kept clean. The Turkish prisoners fared no better than the Russian prisoners; of 57,000 prisoners taken, 13,983 succumbed to various fevers, most of them to typhus fever.

2. THE BOER WAR OF 1899-1901

In the war which England waged against the free states, Orange and Transvaal, and which lasted more than two years and necessitated the transportation, on the part of England, of more than 400,000 soldiers to South Africa, infectious diseases, particularly typhoid fever, played a very important rôle. The English army, which averaged 200,000 men, sustained the following losses :^a

	<i>Died of diseases.</i>	<i>Died in battle and of wounds.</i>	<i>Total.</i>
From Feb. 10, 1900, to the end of that year	7,009	4,088	11,097
In the year 1901	4,318	2,337	6,655
Total	11,327	6,425	17,752

Typhoid fever had always been prevalent in South Africa; the first cases in the English army were observed during the hurried march to Bloemfontein along the Modder River, on which the soldiers were dependent for drinking-water, despite the fact that typhoid fever was known to be raging in places further upstream. The Berkefeld and Pasteur

^a *The British Medical Journal*, 1901, vol. i, p. 160, and 1902, vol. i, p. 167.

filters yielded too little water, for the reason that they soon became clogged; the soldiers used boiled water with reluctance, for the reason that it took so long for it to cool. Another source of infection besides the water was the fine dust that was stirred up by daily wind-storms; this dust, being full of disease-germs, contributed greatly to the dissemination of typhoid fever. Furthermore, the crowding together of soldiers in tents caused many of them to contract the disease by direct communication.⁴

Jameson, the chief of the army's medical staff, lamented the fact that sanitary officers (hygienists), originally appointed to accompany each division of troops, were dismissed. The regular doctors, who were then called upon to perform their functions, were fully occupied with taking care of the wounded, and were probably not well informed as to hygienic investigations and measures. The results obtained from preventive inoculation, which was practised on some of the soldiers, were in general satisfactory.

In other places the conditions were similar to those along the Modder River; in Paardeberg the available drinking-water was equally bad, and in Bloemfontein there was an explosion-like outbreak of fever. From the beginning of the campaign to the middle of the year 1900 there were 13,057 cases of disease in the army, and of those 3,174 terminated fatally; the total number of cases during the entire war was no less than 42,741.

The English troops that were shut up in Ladysmith from November 1, 1899, to February 27, 1900, were very severely attacked by typhoid fever. In the first part of November the English garrison had consisted of 13,496 men, and by March it had dwindled down to 10,164 men. The number of

⁴ 'The Recent Epidemic of Typhoid Fever in South Africa.' Discussions of the Clinical Society of London, on May 8 and 22, 1901. Report in the *British Medical Journal*, 1901. Vol. i, p. 642 ff. and 770 ff. Also in the *Deutsche Med. Wochenschrift*, 1901. *Vereinsbeilage*, p. 189.—Ferenczy, *Die Typhusepidemie im südafrikanischen Kriege (1899-1901), deren Aetiologie und die Präventivimpfungen dagegen*. *Wien. Med. Presse*, 1906, no. 44.

sick soldiers committed to the lazaret amounted to no less than 10,668, and of these 1,766 had typhoid fever and 1,857 had dysentery ; 383 of the former and 117 of the latter died. When the Boers withdrew there were 1,996 patients in the hospital, 708 of them suffering from typhoid fever, 341 from dysentery, and 189 from wounds.⁵

In the Concentration Camps which the English established in the summer of the year 1900 for the accommodation of the women and children in the South African Republics, the pestilences soon gained the upper hand. Lord Roberts had made arrangements to concentrate the families of the Boers in camps ; since the farms of the Boers were systematically burned, these camps were supposed to protect their wives and children against starvation, and at the same time the wives and children served as hostages for their husbands and fathers. When the location of these camps was decided upon, not sanitary, but military considerations were taken into account ; it was necessary that they should be controlled from a near-by fortress. They soon became overcrowded, the supply of water was inadequate, and there was much uncleanness. The inhabitants of the camps were mostly women, children, and old men ; thus, for example, in October 1901, of the people living in the camps in the Orange Free State, 55 per cent were children under fifteen years of age, 31.9 per cent were women, and 13.1 per cent were men, mostly old men. According to the reports submitted to Parliament the condition of health in the Concentration Camps in Natal and in the Cape Colony was not unfavourable, but in those in Transvaal and Orange it was very bad. The following statistics, covering the time between June and September 1901, relate to the Concentration Camps in the Transvaal : ⁶

⁵ 'The Siege Statistics from Ladysmith,' *Brit. Med. Journal*, vol. i, p. 730.

⁶ 'The Rates of Mortality in the Concentration Camps in South Africa,' *Brit. Med. Journal*, 1901, vol. ii, p. 1418.

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NUMBER OF INHABITANTS.

Month.	Men.	Women.	Children.	Total.
June	8,576	16,078	19,811	44,465
July	9,665	20,012	24,462	54,139
August	10,496	22,036	25,983	58,515
September	10,581	22,226	26,599	59,406
Average				54,131

NUMBER OF DEATHS.

Month.	Men.	Women.	Children.	Total.	Annual death-rate.
June	26	48	310	384	103.6
July	51	118	748	917	203.2
August	32	185	1,014	1,231	252.5
September	75	165	1,014	1,254	253.3
Average					209.8

In regard to the Orange Free State the following statistics, including the month of October, were compiled :

NUMBER OF INHABITANTS.

Month.	Men.	Women.	Children.	Total.
June	5,116	9,646	17,953	32,715
July	5,351	11,213	20,132	36,696
August	5,826	13,381	24,415	43,622
September	6,089	14,140	25,118	45,347
October	5,906	14,471	24,929	45,306
Average				40,737

NUMBER OF DEATHS.

Month.	Men.	Women.	Children.	Total.	Annual death-rate.
June	32	75	182	289	106.0
July	50	69	369	488	159.5
August	30	82	510	622	171.1
September	43	153	885	1,081	286.0
October	58	133	1,329	1,520	402.6
Average					235.6

All told, no less than 19,600 persons (14,894 children and 4,706 adults) died in the Concentration Camps up to March 1902 ; that is, about one-fifth of the total number of inhabitants died in a period of about fifteen months. As indicated by the above tables, the children suffered more severely than the adults. The principal causes of the high mortality among

the children were measles and pneumonia ; since the grown-up Boers had never experienced an attack of measles in their childhood, they too, even the very old men, contracted the disease and many of them succumbed to it. The prevalence of pneumonia can be explained on the ground that the temperature fluctuated greatly in the course of the winter, and the nights, in particular, were extremely cold. Whooping-cough, varicella, mumps, and diphtheria were prevalent in all the camps, and typhoid fever, which, as remarked above, is endemic in many parts of South Africa, was very common ; so also were diarrhoea and dysentery.

The chief cause of the high mortality in the prison-camps was the fact that such large numbers of men, men whose vitality had been reduced by privations and hardships, were congregated in places which had not been properly prepared to receive them. The unfortunate prisoners often reached the place of detention in a pitiable condition—exhausted and half naked. Furthermore, they were men who had no appreciation of the order that must be observed, when large numbers of people are congregated in one place, in attending to the daily requirements of nature, nor were they willing to be taught. The result was that the ground became filthy ; the open spaces in front of the tents were often used in place of the latrines ; the contents of slop-jars were simply thrown out in front of the doors, instead of being emptied into receptacles that were deposited here and there for that purpose. The mothers had no idea of nursing, and were unwilling to take medical advice ; in order to avoid having to send their children to the hospital, they kept secret the fact that they were sick, thus giving measles, diphtheria, &c., the best possible chance to spread. We read in an English report :⁷

A large share of the high death-rate in them is ascribable to the condition in which the women and children arrive. Often they have

⁷ 'The Working of the Refugee Camps,' *Brit. Med. Journal*, 1901, vol. ii, p. 1031 f.

been half-starved and are broken down in health. It cannot be wondered at that under these circumstances measles and other diseases are inordinately fatal. The dirty personal habits of the Boers, their use of improper and often disgusting remedies, and their ignorant errors of dietetics in regard to young children, have rendered it extremely difficult to secure favourable results in the treatment of cases of sickness among the Boer children. There appears to be no doubt, as indicated in our previous special article, that the measles which has been prevalent has been of a specially malignant type. Its malignancy has doubtless been intensified by the dirty condition of the Boer children, and by the overcrowding that has been permitted in the camps, as well as by the previous bad health of these children. The present reports afford abundant evidence confirmatory of the conclusion at which we had previously arrived, that dysentery, diarrhoea, and enteric fever in a large proportion of the camps have been prevalent as well as measles.

And in another report we read :⁸

Measles of a particularly malignant type has prevailed. Its fatality has doubtless been increased by the exhausted and semi-starved condition in which many of the Boers and their children have arrived at the camps. It has been impossible to isolate such cases in the camps ; and the crude and ignorant and even mischievous methods of domestic treatment adopted by the Boer women have doubtless increased the evil, as have also the personal uncleanness of the Boers and their fear of fresh air as well as of clean water. But, as previously pointed out, enteric fever and diarrhoea and dysentery have claimed a large toll of victims, and for the excessive amount of these the deficient sanitary control of the camps must be held in a large measure responsible.

With the arrival of the better season, when the Concentration Camps, under the pressure of public opinion, were thoroughly cleansed, the condition of health improved. Hönigsberger,⁹ who inspected the camp at Merebank (in Natal) in May 1912, derived a very favourable impression ; notwithstanding the fact that the camp lay on low ground near the sea-coast, where the soil was necessarily damp,

⁸ 'The Report on the Working of the Refugee Camps' (loc. cit.), p. 1618.

⁹ L. Hönigsberger, *Bericht über das Konzentrationslager Merebank (Natal)*. *Münch. Med. Wochenschrift*, 1902. Vol. xlix, No. 36.

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there was no visible surface water because of an effective system of drainage. The drinking-water facilities were good. Of some 8,000 refugees sheltered there only 110 died between the months of February and May 1902.

3. THE WAR IN SOUTH-WEST AFRICA (1904-7) ¹⁰

In the very first year of the war, typhoid fever broke out with great severity. The disease first made its appearance in the war against the Herero nation in the first part of April 1904; it attacked the eastern division of the army, which was commanded by Major von Glasenapp and numbered twenty-five officers and 509 men, in Onjatu (midway between Windhuk and Waterberg), after the soldiers had been exposed to rainy weather, cold nights, and extreme hardship. On April 6 there were six cases of the disease reported, and by April 16 the number of cases had increased to sixty-six; the division was then transferred to Otjihaenena, where the patients were housed in permanent lazarets and the healthy men were quarantined. Throughout the remaining part of the war, typhoid fever played an important rôle; the total number of deaths in the years 1904-7 was 1,491; of these 689 succumbed to diseases, 439 of them to typhoid fever. The soldiers who fought in the battles against the Hereros were most severely attacked; of a total of 470 deaths 283 were caused by typhoid fever and only twenty-two by other diseases. In the three years' struggle against the Hottentots some 1,200 soldiers died; 375 of them died of diseases; of the 375 typhoid fever was responsible for 156.

4. THE RUSSO-JAPANESE WAR OF 1904-5

The apprehension that the Russo-Japanese War would be accompanied by severe outbreaks of infectious diseases turned out to be groundless. The chief danger that threatened

¹⁰ *Die Kämpfe der deutschen Truppen in Südwestafrika*. Published by the General Staff. Berlin, 1906-7.

both armies was typhoid fever, which is endemic in Manchuria, and which, on account of the filthy condition of the Chinese villages, was given an excellent opportunity to spread. In the first place, the soldiers were prevented from being infected by the fact that they were allowed to drink nothing but boiled water, and were always supplied with hot water for tea; in the second place, when they were called upon to remain in one place for a considerable length of time, they were quartered, not in the Chinese villages, but in earth-huts; or, if they were compelled to live in the Chinese villages, these were always thoroughly disinfected beforehand. Whenever it was possible, the Japanese military physicians, before the troops arrived in a village, investigated the place with reference to hygienic conditions and subjected the inhabitants to an examination. Notwithstanding all this, large numbers of soldiers on both sides, in the course of the war, which lasted twenty-one months, contracted typhoid fever, diarrhoea, and dysentery. In both summers, which are very hot in Manchuria, typhoid fever made its appearance, to a greater extent in the second than in the first, since the troops before and after the battle of Mukden remained encamped for a long time in one and the same place.¹¹ According to the statements of the Russian General Medical Staff,¹² the total number of deaths in the Russian army (excluding the troops at Port Arthur and the fleet) caused by diseases was 7,960, and to these must be added the deaths among the discharged troops; the total number of men in the Russian army was 709,587. Even if these figures are incomplete, nevertheless they distinctly show that epidemic diseases, considering the long duration of the war,

¹¹ E. Haga, *Beobachtungen eines japanischen Divisionsarztes während des Russisch-japanischen Kriegs*. *Deutsche militärärztliche Zeitschrift*, vol. xl, p. 945. 1911.

¹² W. Roth, *Jahresbericht über die Leistungen und Fortschritte auf dem Gebiet des Militärsanitätswesens*, vol. xxxii, p. 91. 1906. *Militärwochenblatt*, 1906. P. 158. *Deutsche militärärztliche Zeitschrift*, 1907. Vol. xxxvi, p. 111.

were not very prevalent. The reports of foreigners who accompanied the Russian army agree in pronouncing the general condition of health excellent.¹³ Spotted fever and anthrax were also observed, but among both the Russians and the Japanese they appeared only sporadically. According to Follenfant,¹⁴ 56,717 cases of infectious diseases occurred among the Russians; of these 25,800 were enterorrhoea, 15,800 were typhoid fever, 8,970 were dysentery, and 4,500 were malaria. Regarding the prevalence of disease in Port Arthur we shall have more to say in the tenth chapter.

Conditions among the Japanese were less favourable, since, on account of their rapid advance, sanitary measures could not be carried out as extensively as was desirable. The total number of men in the Japanese army carried away by diseases was no less than 21,802; 3,956 succumbed to beri-beri, 4,073 to typhoid fever, 1,804 to dysentery, and 11 to typhus fever.¹⁵ All told, 95,572 cases of beri-beri were observed; at first the disease was very common, but later on, when barley was added to the rice, its prevalence decreased. The number of Japanese soldiers killed in battle was very large (47,387), and to these must be added 10,970 who died of wounds.

As to whether or not the war caused typhoid fever and dysentery to spread among the civil inhabitants of Manchuria, as was probably the case, we have no specific information; the appearance of other diseases among the civil inhabitants is improbable, since the troops would certainly have contracted them had they been prevalent.

No information has been given by either Russia or Japan

¹³ W. von Oettingen, *Studien auf dem Gebiete des Militärsanitätswesens im Russisch-japanischen Kriege*, 1904-5. Berlin, 1907.—Schäfer, *Mitteilungen über kriegschirurgische Erfahrungen im russischen Kriege*. Deutsch. med. Wochenschrift, 1905. P. 1837.

¹⁴ Follenfant, *L'hygiène des armées dans les pays froids d'après les enseignements de la guerre russo-japonaise*. Bull. off. de l'Union fédérative des médecins de réserve, 1906, Nos. 6-7. Quoted from W. Roth, op. cit., p. 91, vol. xxxii.

¹⁵ Takaki, 'The Preservation of Health amongst the Personnel of the Japanese Navy and Army.' *Lancet*, 1906. Vol. i, p. 1369.

as to whether the soldiers brought diseases back home with them. In Japan, according to the *Year Book of Statistics*,¹⁶ the number of deaths was as follows :

	<i>Typhoid.</i>	<i>Typhus.</i>	<i>Cholera.</i>	<i>Dysentery.</i>	<i>Beri-beri.</i>
1903 . . .	4,585	9	140	7,172	10,783
1904 . . .	5,100	5	51	5,294	9,408
1905 . . .	6,291	10	34	8,763	11,703
1906 . . .	6,338	5	29	5,173	7,766
1907 . . .	5,974	6	1,702	5,872	8,767
1908 . . .	5,824	9	297	8,053	10,786

In order to prevent the transplantation of infectious diseases into Japan, very comprehensive measures of precaution were adopted by the Japanese military authorities, as was the case after the war with China. Infected soldiers, and soldiers suspected of being infected, were not allowed to join the transports; in order to find them out, three quarantine stations were established, one in Dairei (near Moji), a second in Ninoshima (near Ujina), and a third at Wadano Misaki (near Kobe). When the transports of troops reached their destination, the men were divided into groups of 60 and sent to disinfection establishments, where they were bathed and their effects were disinfected. The sick were committed to the hospital, and suspicious cases were quartered in barracks under observation. If infected men had been found on a ship, the entire ship, crew, and officers, were disinfected. The disinfection establishments received 828,376 men for examination; of these 429,962 were disinfected.¹⁷

5. THE OCCUPATION OF TRIPOLI BY THE ITALIANS (1911)

During the battles fought in connexion with the occupation of Tripoli by the Italians, infectious diseases were confined within narrow limits. According to Sforza, the army physician in Tripoli,¹⁸ cholera broke out there in the second

¹⁶ *Résumé statistique de l'empire du Japon*. Published annually.

¹⁷ Steiner, *Ueber den Sanitätsdienst der Japaner im Krieg gegen Russland*. *Strefflers österr. milit.-ärztl. Zeitschrift*, 1906.—Matignon, *La désinfection des troupes japonaises rentrantes de la campagne de Mandchourie*. *Rev. d'hyg. et de pol. san.*, 1906, p. 661.

¹⁸ Sforza, *Bemerkungen über einige Infektionskrankheiten, die in Lybien*

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half of October 1911, reached its climax in November, and disappeared entirely in the second half of December. The disease was spread chiefly by dates, which had been infected by flies; it first appeared among the native beggars, then spread to the rest of the population, and finally to the Italian soldiers. The pestilence raged only in Tripoli, a fact which Sforza regards as a proof that it was not conveyed thither by the Italians; for had this been the case, cholera would have revealed its presence in Homs, Bengasi, Derna, and Tobruk, in which places thousands of soldiers disembarked, but not a single case of the disease was observed. Typhus fever is endemic in Tripoli; after the Italian occupation twenty cases of that disease were observed among the natives and ten cases among the soldiers. In order to prevent diseases from spreading to Italy, convalescents were not allowed to return home until there was absolutely no danger of their communicating the infection to other persons. The same measures of precaution were used in relation to relapsing fever.

6. THE WAR BETWEEN TURKEY AND THE BALKAN STATES (1912-13) ¹⁹

Regarding the Balkan war definite information is still wanting. Well known, however, is the outbreak of cholera along the Tchatalja lines; but the progress of the disease was soon checked and it did not become very widespread. It first appeared in the camp of the Turks, whither it was borne by troops from Asia, where severe epidemics of it had occurred in Mecca and Tiberias, and where it had made its appearance in several other places. In Constantinople the first case of the disease was reported on November 5, 1912; in the first week of December it had reached its climax, and after

vom Tage der Okkupation an bis März 1912 geherrscht haben. Deutsche mil.-ärztl. Zeitschrift, 1912. Vol. xli, p. 756.

¹⁹ According to newspaper reports and to publications of the Imperial Health Office.

January 20 only sporadic cases were observed. The following table indicates the number of persons who contracted and succumbed to cholera in Constantinople :

					<i>Patients.</i>	<i>Deaths.</i>
Nov. 5-Dec. 2 (1912)	.	.	.	.	934	441
Dec. 3- " 9 "	.	.	.	.	540	229
" 10- " 16 "	.	.	.	.	451	244
" 17- " 23 "	.	.	.	.	276	158
" 24- " 30 "	.	.	.	.	141	74
" 31-Feb. 1 (1913)	.	.	.	.	173	99
Nov. 5, 1912-Feb. 1, 1913	.	.	.	.	2,515	1,245

Among the Bulgarians cholera did not become very widespread; throughout the entire territory occupied by the Bulgarians, cases of cholera, to be sure, were observed, particularly along the Tchatalja lines. But the Bulgarians fought the pestilence with energetic measures; the troops were given nothing but boiled water, and careful attention was paid to what they ate; the railway dépôts were thoroughly disinfected, as were all places in which large numbers of people congregated. During the armistice the Bulgarians were forbidden all intercourse with the Turks. For the troops transported back home quarantine stations were established. The result of all these precautionary measures was eminently successful. In Bulgaria itself only sporadic outbreaks of cholera occurred, as in Sofia, Stara Zagara, and in the district of Shumla; ²⁰ on January 18, 1913, Bulgaria was entirely free from cholera.

Typhus fever broke out very frequently in all the armies, but detailed information regarding its prevalence has not been published. According to the reports which have thus far been issued, the disease did not appear in the form of epidemics in any of the armies; on the other hand, it is stated that it broke out among the Turkish prisoners in Bulgaria and Servia, as in Tatar-Bazarjik, Ligotin, Zajecar, and Kujazevas.

²⁰ K. Kraus, *Über Massnahmen zur Bekämpfung der Cholera auf dem bulgarischen Kriegsschauplatze*. *Wiener klin. Woch.*, 1913. P. 241.—K. J. Schopper, *Erfahrungen über die Cholera in Ostrumelien während des Balkankriegs, 1912*. *Wiener klin. Woch.*, 1913. No. 10.

CHAPTER X

EPIDEMICS IN BESIEGED STRONGHOLDS

WHEN fortified cities are subjected to a long siege the death-rate in them increases considerably ; if diseases break out during the siege, they spread beyond expectation and carry away large numbers of people. The greatest enemy of the people in a besieged city is hunger. Since the approaching hostile army causes the inhabitants of the surrounding country to take refuge in the cities, the latter suddenly become overcrowded, moreover with people who are generally quite penniless and have to be provided for by the rest. In former years, when warfare was much more cruel than it is to-day, this was especially the case. Furthermore, the size of the garrison must be rapidly increased, or perhaps the whole of a retreating army, as was the case in Metz, must be quartered in the stronghold. Accordingly, the first step taken by the commander of a fortress must be to ascertain the quantity of provisions on hand, and to work out an appropriate plan for the distribution of them. How the quality of the bread becomes more and more unsatisfactory, and finally reaches the point where the product is scarcely worthy of the name bread ; how people are obliged to eat the flesh of horses, dogs, and other animals ; how the prices of the necessaries of life soar *ad infinitum*—all this is so well known that it needs no further exposition. Besides the absence of these necessaries of life, the lack of milk, fats, salt, and vegetables is accompanied by various consequences ; very frequently improper and badly prepared food gives rise to a large number of severe cases of intestinal catarrh.

Insufficient nourishment is seldom the direct cause of death ; on the other hand, it frequently so weakens people that they are much more subject to sickness, or, if they have

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already contracted some disease, they are much more likely to die, or, if they recover, to convalesce slowly. Thus Vacher¹ states that typhoid fever, which usually results fatally in one out of four cases, during the siege of Paris carried away no less than forty per cent of those who contracted it; tuberculosis, he says, often acquired an acute form and caused death within a few weeks. Little children present slight resistance to famine. 'In regard to new-born and one-year-old infants I have observed in certain cases that become more frequent every day, that the effects of insufficient alimentation show themselves in the form of a progressive emaciation, which includes all the tissues of the body and almost always has fatal consequences; oedema of the teguments, anaemia, uncontrollable diarrhoea, and continual plaintive crying on the part of the little patients are the characteristic symptoms of that hunger-fever which actually decimates our infant generation.'

Another result of insufficient nourishment, one which has frequently been observed in besieged strongholds, is the appearance of scurvy.

During sieges, the hygienic measures of precaution, which are absolutely essential to the maintenance of health in cities, can no longer be carried out. If spring-water is secured outside the city for the inhabitants, the besiegers cut off the source of supply; if the water of rivers is used, then filtration plants have to be erected. But even filtration does not prevent the appearance of those infectious diseases the germs of which are carried in water, since for washing purposes the river-water is used just as it is found. The removal of refuse constitutes an extremely difficult problem; the cleaning out of privies is often possible only to a very insufficient extent, especially when the besiegers have advanced very close to the city, and the failure to dispose of garbage necessarily causes large accumulations of dirt and filth in the streets; this was especially the case in former times.

¹ Vacher, *La mortalité à Paris en 1870*. *Gaz. médicale de Paris*, 1871, p. 9.

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The burying of so many dead bodies, of both men and animals, especially horses, has met in many sieges with serious obstacles; ¹ if the ditches intended for a large number of bodies are not dug deep enough, the atmosphere becomes polluted; to burn them is impossible, owing to lack of fuel; and if they are cast into the river, this jeopardizes the health of those living further downstream. During certain sieges in the past, hard conditions have made it necessary to leave corpses and carcasses lying in the open, with terrible consequences.

If the siege takes place in the winter, it is very difficult to procure fuel for heating purposes, unless sufficient provision has been made beforehand. In Paris, for example, the inhabitants suffered severely from cold, and to meet the emergency artificial fuel was prepared by mixing stable manure with tar and reducing the mass to solid form under the hydraulic press.

In the following pages we discuss a few sieges which were characterized by severe outbreaks of pestilence.

1. THE SIEGE OF MANTUA (1796-7) ²

During the siege of Mantua, which the French carried on from May 30, 1796, to February 3, 1797, war-pestilences raged with fearful severity among both besiegers and besieged. The city lay in an extremely unhealthy region—malaria was ever prevalent and the drinking-water was bad. The intentional flooding of the region and the great heat of the summer of 1796 caused malaria to break out with great severity and to acquire virulent forms that rendered the disease more dangerous than usual. In the latter part of

¹ O. Oesterle, *Paris und die Hygiene während der Belagerung von 1870 und 1871. Deutsche Vierteljahresschrift für öff. Ges.-pflege*, vol. ix, p. 410. 1877.

² F. Stegmeyer, *Bemerkungen über die Krankheiten, welche unter der Garnison zu Mantua während der Blockade vom 30. Mai 1796 bis zum 3. Februar 1797 geherrscht haben. Abhandlungen der K. K. mediz.-chirurg. Josefs-Akademie zu Wien. Vienna, 1801. Vol. ii, p. 387.*

May 1796, the garrison consisted of 18,000 Austrian troops, whose power of resistance had been greatly reduced by hard service from November on, and by exposure to rain and cold with inadequate means of shelter. Besides intermittent fever, both intestinal catarrh and typhus fever made their appearance in July; the latter, at least, was probably the 'nervous fever' mentioned by Stegmeyer. Thus as early as the latter part of July there were some 2,000 sick men in the garrison. In August the investment was not yet complete, so that the soldiers did not suffer from lack of food. Notwithstanding this fact, however, the diseases increased in prevalence and caused many deaths; the number of sick men was no less than 6,000. On September 12 the Austrian general, Würmser, with about 12,000 men, succeeded in gaining entrance into the city; he brought with him a large number of disabled men who had been wounded in recent fighting, and many of whom succumbed to tetanus and hospital fever. The number of patients now increased to 8,500; as there was no bedding or straw available, the patients were compelled to lie on the bare ground, and the uncleanness of the hospitals grew worse. When the investment was finally rendered complete in October, it caused a great scarcity of meat, fat, and wine; the number of patients that month was 9,000 and the number of deaths 2,560. These figures, however, are not complete, since they do not include the patients in the houses set aside for troops overcome by exhaustion. Up to this time the weather had been good, but in November rain set in; and while intermittent fever then decreased in prevalence, dysentery raged even more furiously, and typhus fever also broke out in a virulent, quickly fatal form. The supply of food now ran very low, and although there was sufficient bread on hand, horse-flesh was the only meat. To add to the general misery, scurvy made its appearance in November, and all those who contracted it died. The extreme cold compelled the patients to keep their clothes on, and they lay without blankets on the hard floors of

the hospital corridors; their number had now increased to 9,500, and 2,400 died in November. In December the misery increased; the cold became more and more intense, the supply of food was almost exhausted, and the wine gave out altogether; scurvy raged in an even more severe and virulent form, being frequently accompanied by copious hemorrhages from various parts of the body. In the hospitals there were 7,354 patients, and 2,021 died in the month of December. In January the acme of misery was reached; the scarcity of food was terrible, and the ravages of scurvy were no less than frightful; 1,968 men in the garrison were carried away in the course of that month. On February 3, 1797, the stronghold was surrendered to the French. The number of patients taken in by the hospitals between September and January exceeded 40,000, and of the garrison, which numbered some 30,000 men, 10,249 (more than one-third of the total) died. Fodéré estimates the total number of deaths in the city of Mantua during the siege at 20,000;⁴ regarding the prevalence of diseases and the number of deaths among the civil inhabitants Steegmeyer unfortunately gives us no information.

2. THE SIEGE OF DANZIG (1813)

Danzig, which in the spring of 1807 had passed through a siege of ten weeks, was once more, in the year 1813, from January 11 to November 29, subjected to the horrors of a siege, which for two reasons was even more horrible than the previous one; in the first place, the garrison was badly infected with disease, causing a severe epidemic to rage throughout the city; and in the second place, the defenders of the stronghold, which was most advantageously located to withstand a siege, were national enemies of the inhabitants. Consequently the latter were not only grossly disregarded in the distribution of supplies, but were actually obliged

⁴ H. Häser, *op. cit.* vol. iii, p. 536.

to turn over all they had to the French and then buy it back at exorbitant prices. And while the inhabitants, and toward the end of the siege the soldiers, too, suffered severely from a lack of the necessities of life, the higher officers and the military officials lived in luxury until the day of the surrender.

Napoleon had assigned the defence of the city to General Rapp, who performed the task with great valour and ability. On the return march from Russia, some 40,000 men of Macdonald's corps had congregated in Danzig, and 5,000 of them were sent away by Rapp; in the middle of January the total number of men in the garrison, including the military officials, was 35,934, consisting of Frenchmen, Poles, Bavarians, Westphalians, Spaniards, Italians, and Dutchmen. While Macdonald's corps had fared pretty well, comparatively speaking, in the Russian campaign, the men were all very much exhausted, and furthermore, typhus fever was prevalent among them. As early as the latter part of January, accordingly, the number of sick soldiers was very large; in fact, only about 10,000 men were healthy and able to bear arms. 'As there were no hospitals, beds, or remedies,' says Friccius,⁵ 'many died from lack of care, and at the same time infectious diseases broke out and made great havoc. A heap of dead men and horses was a common sight in the streets, and in a short time many thousands of the troops, as well as of the inhabitants, were carried away.'

In January the death-rate remained comparatively low; of the garrison about 400 men died in the course of that month. But in February, which was a very cold month, typhus fever spread abroad with great rapidity, so that toward the end of the month some 130 soldiers died every day; no less than 15,000 men lay sick, and the total number of deaths for the entire month amounted to 2,000. When it began to thaw on February 24, the number of patients and deaths increased still more, so that 4,000 men died in March

⁵ Carl Friccius, *Geschichte der Befestigungen und Belagerungen Danzigs*. Berlin, 1834. P. 158.

and 3,000 in April. From April on, the condition of health in the garrison improved, although the number of deaths in the month of May was still no less than 2,000.⁶

As early as February typhus fever had spread to the civil population, which before the siege had numbered some 40,000; a great many civilians, however, had fled from the city before the investment was yet complete. In the months of February and March, according to Blech,⁷ some 200-300 persons died every week, 'including representatives of all classes—physicians, preachers, jurists, merchants, down to the humblest people.' The pestilence raged most furiously among the civil inhabitants in the latter part of March. 'Almost every family was in mourning, and many families were wiped out entirely; the best and most estimable young men were carried away in the prime of their lives. Whole families perished, especially in certain streets which the pestilence seemed to have selected for its chief dwelling-place.'⁸ These were especially the streets inhabited by the poorer classes.

It was not long before a lack of the necessaries of life began to make itself felt in the city. As early as February 27 the Russians had cut off the supply of water afforded by the Radaune, which fed the wells in the city, and this necessitated dependence upon rain-water. For the purpose of obtaining new supplies of food, a sortie along the Nehrung was undertaken on April 27; and while the enterprise was successful, the only persons who really derived any benefit from it were the higher officers and military officials, who sold butter, milk, and corned beef at exorbitant prices. Thus the well-to-do citizens, at least, were able to secure food by paying an excessive price for it. In May the conditions among the poor became a great deal worse; they were obliged to eat things that were

⁶ Pringle, *op. cit.*, p. 240.

⁷ A. F. Blech, *Geschichte der siebenjährigen Leiden Danzigs von 1807-14*. Danzig, 1815. Part ii, p. 23.

⁸ Blech (*loc. cit.*), vol. ii, p. 61.

positively disgusting; horse-meat and waste from the breweries were delicacies, while cats and dogs were also devoured. The rations of the soldiers grew smaller and smaller, although there was sufficient grain on hand to keep them supplied with bread. Says Friccius,⁹ in regard to a sortie undertaken on June 9, 'How hungry the troops in the garrison were is indicated by the fact that they cut up every horse that was killed in battle and took the edible parts with them.'

After the conclusion of the armistice, which became known in Danzig on June 10, there was a pause in the siege lasting until August 18; during this time the besiegers brought food to the garrison every five days, but absolutely no provision was made for the civil inhabitants. During the armistice many citizens left the city; indeed the French expelled from the city all persons who were not sufficiently provided with the necessaries of life. At first the Russians allowed the fugitives to pass through their lines, but later on they raised objections, so that a large number of the unfortunate inhabitants were obliged to live in the open fields between the besiegers and the besieged, where many of them died of starvation. In the latter part of September General Rapp allowed some 300 of them, who had managed to keep alive, to return into the city. Blech asserts that the emigration of beggars and others of the poor reduced the population of the city by some 16,000.¹⁰

In October, lack of the necessaries of life reached a climax, so that rats and mice were eaten. Since the scarcity of provender made it necessary to slaughter almost all the horses, the soldiers were supplied with large quantities of horse-meat. On November 1 the granaries, in which were kept the provisions of the garrison, were destroyed by fire, resulting in the loss of about two-thirds of the provisions. This made it necessary to reduce the soldiers' bread-rations, and the

⁹ Friccius, *op. cit.*, p. 203.

¹⁰ Blech, *op. cit.*, vol. ii, p. 204.

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bread with which they were supplied was made of half-burned flour and of rusks fished out of the stinking Mottlau ; 'it was so disgusting that only ravenous hunger could induce anybody to eat it.' ¹¹

In consequence of hunger and the unnatural food eaten, the mortality among the civil inhabitants, the number of whom had dwindled down to 16,000, became very high ; the number of deaths per week in the month of October was no less than 50-80, to which, according to Blech, must be added the deaths among the poor which were no longer reported. In the first part of November there were some 80-90 deaths per week. On November 29 General Rapp surrendered the city to the Russians and Prussians ; but since the conditions of capitulation could not be agreed upon until January 1, 1814, there was an interval of about a month during which the French garrison, but not the civil population, was supplied with food ; consequently the death-rate among the citizens remained high. Furthermore, the besiegers, among whom a virulent typhus had been raging since October, communicated the infection to the inhabitants, 107 of whom succumbed to it in the last week of November, 133 in the first week of December, and 138 in the following week. On December 1, permission was obtained to establish a market, and from that time on, the citizens could once more provide themselves with food in a regular way.

The loss of human life inside the besieged stronghold was terrible ; of the 35,900 troops in the garrison, 15,736 according to Friccius died in the lazarets ; at the time of the capitulation only 16,532 men were left, and of these 1,482 were sick and had to be left in the city. According to Blech, a total of 5,592 civilians died, 1,142 of them in the last three months (October-December) of the year ; the number of deaths in December alone was 473. Toward the end of the siege some ninety persons died of starvation. ¹²

¹¹ Friccius, *op. cit.*, p. 284.

¹² Blech, *op. cit.*, vol. ii, p. 296.

3. THE SIEGE OF TORGAU (1813)¹³

On May 10, 1813, when Napoleon had appeared in Saxony, and the King, after considerable hesitation, had decided in his favour, the Saxon garrison of Torgau, at that time a place of 5,000 inhabitants, was replaced by a French army-corps. In the course of the summer large transports of sick soldiers from various lazarets arrived at Torgau, and on July 18 alone 3,000, sick men and 1,000 convalescents came from Dresden. Consequently the number of sick in the stronghold was very large even before the siege began; all public buildings had been converted into lazarets. But even these were not numerous or large enough to accommodate all the patients, who numbered some 6,000 in the month of September, so that the occupants of houses along entire streets were driven out of their homes, which were used for lazarets and barracks. 'A virulent, putrid fever' raged in all the lazarets, and at least one-third of the persons who contracted it died; the inhabitants and the Frenchmen quartered in the homes of citizens were at first spared by the disease.

After the battle of Dennewitz (September 6, 1813) the head-quarters of the third and fourth French army-corps was transferred to Torgau, where also numerous fugitives took refuge; at the same time the large French head-quarters from Dresden arrived, so that the size of the garrison was increased by 10,000 men and 5,000 horses. After the battle of Leipzig the stronghold was besieged by the Prussians, and presently the supply of food ran low and the uncleanness in the streets and houses grew incredibly worse. 'Then the pestilence began to spread at an alarming rate among the inhabitants and among the Frenchmen quartered in the

¹³ F. Lehmann, *Beobachtungen des im Jahre 1813 in Torgau herrschenden Typhus. Annalen der Heilkunst des Jahres 1814.* P. 506.—G. A. Richter, *Geschichte der Belagerung und Einnahme der Festung Torgau und Beschreibung der Epidemie, welche daselbst in den Jahren 1813 und 1814 herrschte.* Berlin, 1814.

homes of citizens, so that the entire city of Torgau came to resemble a large, overcrowded lazaret.¹⁴

'The regular lazarets now became veritable hot-beds of misery; they were scarcely able to accommodate the large number of patients, who numbered at least 12,000, and whom it was necessary to place so close together that they almost touched one another. There was a lack of straw and of other necessities, of sick-attendants and physicians, of effective remedies, and especially of order and proper superintendence.' The patients suffered partly from severe, fetid diarrhoea, and partly from typhus. In the courtyards there were enormous accumulations of dirt and refuse, and the doors leading into many of the sick-rooms could scarcely be opened owing to the collections of foul matter which covered the floor ankle-deep; in order to reach the sick it was necessary to wade through this and to climb over dead bodies. Absolutely no thought was given to keeping the rooms warm. 'Thus it is quite natural that among these horrible surroundings the slightest wound, the most insignificant indisposition, could easily have a fatal termination, and that it was like sentencing a man to death to bring him to the lazaret.' The number of deaths exceeded 8,000 in the month of November alone.

Equally terrible were the conditions in the other parts of the city; all the private houses were overcrowded with patients and filled with dirt. A sickening odour permeated the atmosphere; in the ditches around the fortress and in every corner of the city lay dead horses, rotting straw sacks, ragged uniforms, and even human corpses. Refuse of the worst kind was piled up in the streets, often as high as the second story. 'At this time', says Lehmann, 'Torgau looked more like a lazaret than a city inhabited by healthy persons; for who would have been able to find a house in which there were no persons suffering from nerve-fever? Parlours, bedrooms, halls, stables, kitchens, and cellars—all were filled with

¹⁴ Richter, *op. cit.*, p. 9.

patients.' The barracks and guard-rooms resembled hospitals. In a few weeks more than 600 inhabitants died; entire families were wiped out by the epidemic, and there was scarcely one which was not mourning the loss of one of its members.

Up to the beginning of December the number of patients steadily increased; in the lazarets alone, 300 soldiers died every day.

The terrors of the bombardment had a very disastrous effect upon the inhabitants of the city, since it compelled them to live in damp, unhealthy, infected cellars. Not until the latter part of December did the epidemic begin to abate and to lose, at the same time, its virulent character; the arrival of very cold weather, as well as the diminution of the number of people, and the fact that the infection had practically run its course among the inhabitants and the garrison, were at least partly responsible for this abatement; furthermore, there was now less crowding, and it became possible to establish better order.

The lack of system in the French lazarets is shown by the fact that the authorities were never once able to give an account of the number of persons that died in them. From grave-diggers' records and church registers Richter managed to compile the following table of statistics indicating the number of deaths:¹⁵

	<i>French soldiers.</i>	<i>Saxon soldiers.</i>	<i>Civil inhabitants.</i>	<i>Total.</i>
January-August (1813)	—	—	222	—
September . . .	1,107	64	43	1,214
October . . .	4,803	36	66	4,905
November . . .	8,209	3	228	8,440
December . . .	4,886	—	258	5,144
January 1-10 (1814)	649	—	83	732
January 11-31 . .	314	—	91	405
February . . .	400	—	79	479
March . . .	100	—	52	152

¹⁵ Richter, op. cit., p. 19. The figures do not exactly coincide with those published by Bürger. Compare J. C. A. Bürger, *Nachrichten über die Blockade und Belagerung der Elb- und Landesfestung Torgau, 1813*. Torgau, 1838. Quoted in C. F. Riecke, *Der Kriegs- und Friedenstypus in den Armeen*. Potsdam, 1848. P. 120.

According to this table there died, between September and January 10, 19,654 French soldiers, 103 Saxon soldiers, and 678 civilians. But Richter says in regard to the above figures: 'There is no doubt, however, that the figures pertaining to the French soldiers are much too small, since they include only those that were actually buried by the grave-diggers in public burial-grounds. All those who died in private houses, in the *tête-de-pont*, in the various forts, in the lunettes, or in any of the outworks of the fortress are not included; their number was by no means small, and many of them were buried unceremoniously by citizens or by their comrades, while large numbers of bodies were left lying in the open.' In the month of May it was impossible to find a grave-digger to bury the heaps of corpses, which were consequently thrown in masses into the Elbe; this of course interfered with the operation of the floating mills along the river. Nor are the bodies disposed of in this way included in the above table. Accordingly, Richter estimates the total number of deaths among the French soldiers at between 29,000 and 30,000 men.

The pestilence continued to rage even after the surrender of the stronghold, and did not begin to abate until the latter part of January. Although the Prussian troops were not quartered in the city, and entered it only in the day-time, the pestilence nevertheless spread to them and carried away more than 300 men in the course of three months. Not until the end of February did the pestilence among the civil inhabitants begin to abate; the mortality was still high in March, but in April it sank to normal again.

According to Richter, two-thirds of the patients in the military lazaret were suffering from 'colliquative, dysenteric diarrhoea', and only one-third from 'true typhus', whereas among the civil inhabitants the latter was by far the more common. There were two forms of diarrhoea observed; it appeared either as an acute attack of dysentery, which rarely lasted longer than two weeks and then terminated in either

death or recovery, or else as a chronic, dysenteric diarrhoea, which caused general weakness and finally death.

Typhus fever began always with a frequently recurring chill, and with a violent headache and general indisposition; this was followed by a stage of dry fever, accompanied by stupor, dizziness, and often wild delirium; as a rule the first few days were characterized by obstinate constipation, and bleeding at the nose was very common. Later on, somnolence manifested itself, and the original constipation changed to a copious, fetid diarrhoea. Petechiae appeared frequently, but not invariably; at first small, bright-red spots showed themselves, and later on they assumed a darker colour, grew larger, and finally turned black. Their size varied considerably; sometimes they were the size of a pin-head, while often they were from one to one-and-a-half centimetres in diameter. Most of the patients died between the tenth and fifteenth days; but if the disease progressed favourably, signs of improvement usually showed themselves suddenly on the fourteenth or fifteenth day; as a rule, convalescence was of short duration.

The two forms of 'nerve-fever' mentioned by Richter doubtless include various other diseases. That many cases of typhus fever were among the fever patients may be inferred from the fact that the disease was very prevalent among the French troops, and also from Richter's description; he expressly mentions the sudden appearance of the disease, the initial chill, the remission of the fever in the third week, and the rapid convalescence—all of them characteristic signs of typhus fever. Moreover, typhoid fever doubtless prevailed more or less extensively. Richter describes 'a pituitous modification of typhus', with a lingering development;¹⁶ the crisis always came late, frequently not until the sixth or seventh week, and was invariably uncertain, so that convalescence was very slow and often interrupted by relapses. Deuteropathic complications were of almost regular occurrence. There can be no doubt that we have to do here with a good

¹⁶ Richter, *op. cit.*, p. 54.

description of typhoid fever, which revealed its presence chiefly among the newly-conscripted young French soldiers.

Regarding the enormous loss of life caused by the epidemic in Torgau, Richter, who was a Prussian military physician, says: 'The devastation that it caused among the Frenchmen, and unfortunately among the inhabitants of the ill-fated city as well, was indeed terrible; in fact there is happily scarcely a parallel to it in the history of the world. One may safely say that the misery experienced by the French troops throughout the entire course of that disastrous war reached its climax inside the walls of Torgau. The French lazarets in the city represented scenes of horror such as repel human nature, and such as one must actually witness in order to appreciate fully their dreadfulness.'

4. THE SIEGE OF MAYENCE (1813-14)

The terrible devastation caused by typhus fever in the strongholds along the Vistula, Elbe, and Rhine, which were so valorously defended by French generals in the years 1813-14, excited general consternation. Wittmann¹⁷ furnishes a very accurate description of the misery undergone in the besieged cities, especially the city of Mayence. First he comments on the scarcity of supplies, observing that the vicissitudes of war can never be foreseen; furthermore, he asserts that the commanders of fortresses, when they anticipated a siege, purposely kept the inhabitants in uncertainty about it. In the case of Mayence, Napoleon ordered the city to be provisioned after the battle of Leipzig. Some 2,000 oxen were collected, and most of them were kept in the villages surrounding Mayence; but when the Allies crossed the Rhine the oxen were all quickly driven into the city, where they grew lean owing to lack of provender, and died of rinderpest in such large numbers that it

¹⁷ F. J. Wittmann, *Erfahrungen über die Ursachen der ansteckenden Krankheiten belagerter Festungen*. Mayence, 1810.

became necessary to slaughter them all and salt the meat. This was done in such a careless way that a large part of the meat was spoiled; even after the stronghold surrendered, some of this salted meat was still on hand, and it was so rotten that it had to be destroyed. The citizens had learned of the danger too late, and numerous unscrupulous citizens bought up all the important necessities of life and then took advantage of the situation by raising the prices so high that only the wealthy could procure food. Lack of good bread, which had been so scarce during the previous siege of Mayence (1793), does not seem to have been so severely felt in the siege of 1813. Particularly noticeable was the want of fuel, so that many soldiers froze to death in the exposed guard-rooms of the outworks. Legumes, especially peas, could not be thoroughly cooked, so that it was frequently necessary to throw them away. The supply of good fat, as well as of fresh vegetables, soon ran out, while the great quantity of alcoholic beverages stored up in Mayence had a very detrimental effect. Very inadequate provision was made for the sheltering of the soldiers; inasmuch as the siege took place in the winter, they could not camp in the open, and the barracks were not large or numerous enough to accommodate them. Consequently the officers were quartered in the homes of the wealthier citizens, one officer in each house, while the troops were housed in large numbers in the often insanitary homes of the poorer people. This of course greatly favoured the dissemination of infectious diseases.

According to Wittmann, there was not a single trace of an infectious disease in Mayence in September 1813. In October the field-lazarets of the army were transferred from Leipzig to the West, and most of them passed through Mayence; in the first part of November, moreover, the field-army itself passed through the city on its return march; thus sick and healthy soldiers conveyed typhus fever into the stronghold. 'In the vicinity of the hospitals and churches, where sick soldiers were congregated, in the streets through

which these doomed victims passed, and in the houses in which they were quartered together with healthy men, or into which they had crept from sheer inability to go further, contagious typhus broke out first and with the greatest severity.¹⁸ Dr. Petit, the commissary sent out by the government in Paris, did not have the courage to oppose the will of Marshal Marmont, who was in chief command, and so he sought to pacify the inhabitants by means of notices in the papers to the effect that the prevailing disease was neither epidemic nor infectious, and was only contagious typhus.

After the investment was complete, typhus fever caused terrible devastation throughout the city. When the siege began, Mayence had a garrison of some 30,000 men, while the civil inhabitants numbered about 24,500; to the latter, however, must be added a considerable number of refugees from the surrounding country. The bad hospital arrangements, as always happened at that time, greatly helped to spread the disease in Mayence. According to a report made out by two French physicians and reproduced by Wittmann, the air in the hospitals was terrible; every bed was occupied by two patients, while the straw under them and the blankets over them were never changed or washed, so that they must necessarily have constituted a source of infection. A report by Kerckhoffs¹⁹ regarding the Mayence hospitals describes even worse conditions:

I was appointed to serve in the hospital established in the Municipal Octroi Building, and the first time that I went there I found the living and the dead, the wounded and the sick, scattered in confusion all over the place. The sick were stretched out on the floor, without even straw under them, covered with ordure. I was obliged to pick my way on tip-toe in order not to sink up to the ankles in filth. I saw sick men lying beside the dead bodies of their comrades.

¹⁸ Zenzen, Leydig, and Renard, *Ueber das ansteckende Nervenfleber, welches in den Jahren 1813 und 1814 in Mainz herrschte*. *Horn's Arch. für med. Erfahrung*, 1814. 449.

¹⁹ J. R. L. Kerckhoffs, *Observations médicales, etc.* Maestricht, 1814. P. 68f.

In effect, there were so many of them that they were lying on top of one another. In some of the rooms the windows were closed, so that no air could enter; in other rooms there was neither glass nor boarding in the doors or windows, notwithstanding the extreme cold. The sick men told me that they had been in that same position for two, three, and even four days, without having had a drop of water.

The soldiers under arrest, who were compelled to clean out the hospitals, all died, no more sick-attendants were to be found, and a large number of physicians perished in the performance of their duties; all the persons employed in the hospital entirely neglected their duties, and most of them were drunk all the time, since large quantities of wine were on hand for the patients.

The result was that the epidemic gradually attained to enormous dimensions. 'The infection', Wittmann,²⁰ 'carried away all the grave-diggers one by one, and it was impossible to find anybody who was willing to do that dangerous work. Thousands of dead bodies of citizens and soldiers lay for weeks in front of the Münstertor, where they were piled up like logs pending burial.' In December and January the epidemic reached its climax; after that it gradually abated, but did not come to an end until May 3, 1814, when the siege terminated and the Allies entered the city.

In the period between November 1, 1813, and May 3, 1814, 7,000 deaths among the soldiers are recorded in the civil register of the city; according to statements of the grave-diggers, some 10,000 or 11,000 more soldiers were buried, whose names were not entered in the register for the reason that they could not be ascertained; nor do the above figures include the number of deaths in the stronghold of Kastel on the other side of the Rhine. Of the civil inhabitants, 2,445 (about one-tenth of the population) died; a large number of physicians contracted the disease, and four physicians and five surgeons succumbed to it.

²⁰ Wittmann, *op. cit.*, p. 150.

5. THE SIEGE OF PARIS (1870-1)²¹

After the battle of Sedan the Germans immediately began to march toward Paris; on September 15, 1870, the first cavalymen appeared before the capital, and on September 19 the investment was complete.

An exhaustive account by H. Sueur and a large number of other reports offer us very full information regarding the condition of health in Paris during the siege, since the administrative apparatus never stopped running. The approach of the German armies caused numerous well-to-do citizens to leave the city; some went south, some to Switzerland, and some to England. Sueur estimates their number from the reports of the railroad companies at 300,000. On the other hand, a large number of the inhabitants of the surrounding country sought refuge in the city; their number is estimated at 180,000. Furthermore, the size of the garrison was considerably increased; the number of men in the regular army on November 4, 1870, is estimated at 236,941, and this does not include 8,000 men in the First Division of the First Corps. To the above, moreover, must be added the number of soldiers who died between the beginning and the end of the siege. Thus the number of men in the regular army at the beginning of the siege was some 246,000; of these some 56,000 were already in the city in the middle of the summer, while the remaining 190,000 arrived later. Accordingly, the total number of people in the city shortly before the siege began was increased by 70,000. Legoyt estimated the population of the city on July 1, 1870, at 1,890,000, so that on the opening day of the investment there were 1,960,000 (in round numbers, 2,000,000) people in Paris. The arrival of the 190,000 soldiers altered the composition of the population, since the increase augmented only the number of males between the ages of 20 and 40.

²¹ Vacher, *La mortalité à Paris en 1870*. *Gaz. méd. de Paris*. 42^e année, 1871, p. 9.—Bourchardet, *L'hygiène de Paris pendant le siège*. *Gaz. des Hôpitaux*, 1870, No. 46.

A severe epidemic of small-pox raged in Paris, as stated above, even before the siege took place. In the first part of the siege, moreover, the disease raged with 'even greater fury in the city, since most of the young newly-enlisted mobile guards had never been vaccinated. The maximum of deaths caused by it were reported between November 6 and November 27. We have already described the course of the small-pox epidemic in Paris.²² It was influenced neither by hunger nor by cold, but developed chiefly for the reason that it was impossible to congregate and isolate the large number of unvaccinated and susceptible persons.

Typhoid fever, dysentery, and diarrhoea, because of the unfavourable conditions brought about by the siege, became very widespread and virulent. Whereas in the year 1869 there were 630 deaths caused by typhoid fever, during the siege of 1870 no less than 3,475 persons succumbed to that disease. Dupinet²³ thinks that the above number is too small, because the disease was often not recognized, and pneumonia, a common complication, was entered as the cause of death. Inasmuch as typhoid fever was endemic in Paris, and as the native inhabitants had acquired immunity by recovery from an attack in the early part of their lives, those who were most severely afflicted by the disease were chiefly the soldiers in the army and the refugees from the surrounding country. The largest number of deaths was reported in the twentieth week of the siege, i.e. between January 14 and 20.²⁴ No less than 375 persons succumbed to typhoid fever in the course of that week, whereas in the corresponding week of the previous year only sixteen deaths had been reported. The largest number of deaths caused by dysentery and diarrhoea in a single week was reported somewhat later; the limited prevalence of these diseases

²² Chapter VIII.

²³ Dupinet, *Des principales causes de la mortalité à Paris pendant le siège*. Paris, 1871.

²⁴ O. du Mesnil, *La mortalité à Paris pendant le siège*. *Ann. d'Hyg. publ.* Series II, vol. xxxv, p. 413. 1871.

during the siege is indicated by the fact that in the half-year 1869-70 the number of deaths caused by them was never more than twenty per week. From statistics compiled by Sueur we have arranged the following table (p. 323), which also includes the deaths caused by bronchitis and pneumonia, but not the victims buried on the battle-fields, of whom there were some 3,000.

The table indicates the gradual diminution of the food-supply. In December the quality of the bread grew worse and worse; white bread could no longer be baked, and in its place an almost inedible form of brown bread was made out of bran, wheat, rye, rice, barley, and oats. Particularly noticeable was the lack of good fats, making it necessary to prepare foods with a bad-tasting tallow that was sold under the name of 'Beurre de Paris'. Since the cattle had to be slaughtered (those that were not killed died of various diseases), there was very soon a great scarcity of milk, making it very difficult to feed infants.²⁵

Several persons have maintained that the extreme cold exerted considerable influence upon the death-rate; and a glance at the two columns in the table indicating the number of deaths caused by pneumonia and bronchitis would seem to justify this contention. How great the difference was, as compared with normal years, will be obvious when we call attention to the fact that, whereas in the twenty-second week of the siege (January 28-February 3) 627 persons succumbed to bronchitis, in the preceding year only seventy-six deaths were caused by that disease between January 30 and February 5, and that, whereas from 465 to 468 persons succumbed to pneumonia between January 21 and February 18, 1871, the number of deaths caused by that disease in the corresponding period of the previous year varied from 90 to 119 per week.

According to the unanimous verdict of the Paris physicians, typhus fever did not make its appearance during the siege.

²⁵ Bouchut, *Alimentation des nouveau-nés pendant le siège de Paris*. *Gaz. des Hôpitaux*, 1871, p. 35.

MORTALITY DURING THE SIEGE OF PARIS

No. of the week.	First and last day of the week.	Important ordinances and events.	Average no. deaths in the years 1867-9.	Total no. deaths during the siege.	No. of deaths during the siege caused by					
					Small-pox.	Typhoid Fever.	Dysentery.	Diarrhoea.	Pneumonia.	Bronchitis.
1	Sept. 4-10		889	981	116	39	8	25	54	45
2	Sept. 11-17		853	1263	168	45	10	65	66	55
3	Sept. 18-24	Sept. 19, investment completed . .	821	1272	158	45	9	43	62	61
4	Sept. 25-Oct. 1		766	1344	210	56	23	46	46	36
5	Oct. 2-8	Oct. 8, meat ration fixed at 100 gr. for adults, 50 gr. for children . . .	754	1483	212	54	18	69	50	56
6	Oct. 9-15		737	1610	311	54	26	72	64	55
7	Oct. 16-22		761	1746	360	55	23	76	66	70
8	Oct. 23-9		754	1878	378	62	49	99	71	77
9	Oct. 30-Nov. 5	Oct. 30, requisition of fuel . . .	767	1762	380	61	32	87	69	72
10	Nov. 6-12		781	1885	419	62	39	91	79	82
11	Nov. 13-19		780	2064	431	94	25	91	73	92
12	Nov. 20-26	Nov. 21, requisition of potatoes . .	793	1927	386	103	25	92	81	89
13	Nov. 27-Dec. 3		833	2023	412	140	25	76	92	99
14	Dec. 4-10		833	2455	398	137	33	83	108	107
15	Dec. 11-17	Dec. 15, horse-meat ration fixed at 50 gr. per head . .	884	2728	391	173	38	103	131	190
16	Dec. 18-24	Dec. 19, reduction of bread ration to 300 gr. for adults, 150 gr. for children	854	2728	388	221	30	73	147	172
17	Dec. 25-31		856	3280	454	250	51	98	201	258
18	Jan. 1-6	Jan. 4, beginning of bombardment . .	838	3680	329	251	52	151	262	343
19	Jan. 7-13		902	3982	339	301	46	143	390	457
20	Jan. 14-20		903	4465	380	375	42	137	426	598
21	Jan. 21-7		936	4376	327	313	48	134	478	548
22	Jan. 28-Feb. 3		951	4671	258	324	63	150	465	627
23	Feb. 4-10	Feb. 4, armistice. First supplies brought in . .	955	4451	225	260	57	144	468	593
24	Feb. 11-17		974	4103	174	298	59	158	471	539
25	Feb. 18-24		995	3941	134	301	52	181	410	557
26	Feb. 25-Mar. 3		984	3500	147	260	50	190	338	424
27	Mar. 4-10		1020	2993	85	258	60	142	267	379
28	Mar. 11-17		975	2576	98	229	49	104	188	301
			24148	75167	8068	4821	1042	2923	5623	6982

Scurvy broke out, but did not become at all widespread; sporadic cases of the disease were observed among the civil inhabitants, while in the prisons and hospitals it was somewhat more prevalent. Delpech²⁶ attributes the appearance of the disease to the lack of fresh vegetables, which were very expensive and could not be given out in the public establishments. Among the soldiers the disease broke out only in Fort Bicêtre, the garrison in which consisted of 800 marines, of whom some seventy or seventy-five contracted it. None of them were given any salted meat, and Grenet²⁷ contends that the outbreak was caused by the lack of light and air in the small casemates, and by arduous service, especially in the night. But here, too, the real cause was probably to be found in the lack of fresh vegetables, which Grenet does not mention.

The death-rate in Paris during the siege was about three times as high as normal. Sueur has estimated that in the years 1867-9 the mortality in the twenty-eight weeks corresponding with those in the above table was 13.1 per 1,000 inhabitants, whereas in the twenty-eight weeks of the siege the mortality was 38.6 per 1,000.

6. THE SIEGE OF PORT ARTHUR (1904)

Port Arthur was besieged by the Japanese from July 30, 1904, to January 2, 1905—a period of 156 days. Whereas, as stated in the last chapter, the condition of health in the Russian army was good, the sanitary conditions in Port Arthur during the siege were very bad, since the supply of provisions that had been laid in proved to be insufficient.²⁸

²⁶ A. Delpech, *Le scorbut pendant le siège de Paris*. *Ann. d'Hyg. publ.* Series II, vol. xxxv, p. 297. 1871.

²⁷ A. L. Z. Grenet, *Le scorbut au fort de Bicêtre pendant le siège de Paris par les Prussiens, 1870-1*. *Ann. d'Hyg. publ.* Series II, vol. xxxvi, p. 270. 1871.

²⁸ J. Okuniewski, *Port Arthur*. *Sanitäre Skizzen, Mitteilungen aus dem Gebiete des Seewesens*, 1911, No. 5. (Quoted from *Der Militärarzt*. Supplement to the *Wiener med. Wochenschrift*, 1911, No. 23.)—Johann Steiner,

The offer made on August 16 by General Nogi and Admiral Togo, granting all the women, children (under 16 years), ecclesiastics, members of the diplomatic corps and military and naval attachés of foreign powers permission to leave the stronghold, was refused by General Stössel. As early as August 5 horse-meat began to be distributed;²⁹ from September 17 on the troops were supplied four times a week with horse-meat, since there was no other fresh or canned meat available. At this time almost everything in the city was consumed, though the Chinese secretly brought rice, eggs, and other things, on boats from Chufoo. After September 28 the soldiers were given meat only twice a week (one-half of a pound of horse-meat or one-third of a can of preserved meat). Regarding conditions up to October 20 we are informed by the report of the Russian General Medical Staff:³⁰ 'The supply of food ran lower and lower; beef gave out very early, only a small quantity of canned meat was left, and even the portions of horse-meat had to be dealt out very sparingly, as we had very important use for horses in transporting ammunition, water, food, &c., to the various positions. In the city it became more and more difficult every day to procure food; meat, if by any chance a small quantity was marketed, was sold in the stores for one and one-half roubles per pound. A chicken cost twelve roubles, a goose twenty roubles, an egg one rouble, a pound of onions one rouble, a pound of horse-meat one half-rouble.'

In November all the soldiers were given was horse-meat; only the sick received canned meat. The supply of food in the possession of private individuals was exhausted, while garlic and vegetables had given out altogether.

On September 19 the Japanese captured the redoubts

Der Sanitätsdienst im Kampf um Port Arthur, 1904-5. Der Militärarzt, 1908, Nos. 11-12.

²⁹ *Der Russisch-japanische Krieg.* Official account published by the Russian General Staff. German Edition by Freiherr von Tettau, vol. v, part 2. Port Arthur. Berlin, 1912. P. 224.

³⁰ Loc. cit., p. 224.

controlling one of the aqueducts that supplied Port Arthur with water; there was however another aqueduct, and, furthermore, wells were bored and a plant for distilling seawater was put into operation. The statement of the Russian General Staff that there was at no time a serious scarcity of water is not confirmed in Olga von Baumgarten's diary, which frequently refers in plaintive terms to the lack of drinking-water in the lazarets.³¹

During the summer the condition of health among the Russian troops was comparatively good; ³² on August 26 there were 192 officers and 5,661 men in the lazarets. In the first part of October typhoid fever broke out in Port Arthur, where it was endemic, and before long an epidemic of such severity was raging in the city that it was difficult to find places in which to shelter the patients. There were also a great many cases of dysentery. Owing to the lack of preserved meat and vegetables, scurvy also made its appearance; the first cases of the disease were observed early in October. In the latter part of that month there were in the lazarets 450 typhoid-fever patients, 855 dysentery patients, and 167 scurvy patients. In addition to these diseases, cases of night-blindness (inability to see after dusk) were observed; the latter disease is quite common among Russian country-people, being caused by bad nourishment.

In December the garrison was completely exhausted. Scurvy had become more and more widespread, and between the fourteenth and twenty-seventh of that month 71 officers and 1,790 men had been committed to the lazarets. On the day of the surrender (January 2, 1905) the number of men in the Russian garrison was 32,400, and of these 6,458 were lying sick or wounded in the lazarets.³³ Of the remaining 25,942 men, 13,207 were incapacitated; thus the number of

³¹ Olga von Baumgarten, *Wie Port Arthur fiel*. Translated from the Russian by Lilli von Baumgarten. Strassburg and Leipzig, 1906.

³² Loc. cit., p. 188.

³³ *Russisches Generalstabswerk*, vol. v. 2, p. 453 f.

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healthy men (besides 2,193 marines) in the garrison at the time of the surrender was only 12,735. Regarding the loss of life during the siege we find no information in the report of the General Staff. The number of soldiers in the city (excluding the officers and officials) was 41,780 at the beginning and 32,400 at the end of the siege. No further information regarding the condition of health among the civil inhabitants of Port Arthur is obtainable.

CONCLUSION

THE history of war-pestilences has shown how severely belligerent armies are attacked by infectious diseases, how seriously their operations are hampered by them, and what loss of life such diseases cause by spreading to non-combatants. If we start from the time when more or less accurate descriptions enable us to determine the nature of the epidemics, we find that plague and typhus fever were the two diseases which, until a few decades ago, most commonly attacked the soldiers; the latter disease, which made its appearance in almost every war that was waged between the beginning of the sixteenth and the middle of the nineteenth century, consequently acquired the name 'war-plague'.

For a long time nobody knew just how to combat these pestilences, and nowhere were rational measures adopted aiming to prevent them from spreading. We have seen the bitter truth of this statement in connexion with the endless Napoleonic wars. One reason for the neglect of preventive measures was the belief that these pestilences broke out spontaneously when large numbers were crowded together under miserable living conditions. The physicians of that time, in their efforts to explain the sudden appearance of these pestilences, arrived at the conclusion that they were autochthonic. But modern medical science, realizing its limitations, contents itself with the hypothesis that the original cause of these diseases is not to be ascertained, and with the knowledge that the infective agents in the case of almost all of them have been discovered, and that an outbreak of any infectious disease in any specific locality signifies that the germ of that disease must in some way have been deposited there. It was precisely the belief in the

spontaneous origination of pestilences that led people to neglect watching for and isolating, with all possible dispatch, the first cases—a measure which is to-day looked upon as the most important means of preventing the dissemination of a disease.

The belief in the autochthonic origin of diseases continued to prevail until the first half of the nineteenth century. Hecker upheld it in a discussion of the plague-epidemic that occurred during the Russo-Turkish War of 1769-70; he believed that the intermittent fever prevalent in the Danube countries passed over into putrid fever, with or without petechiae, that carbuncles and buboes gradually developed, and that putrid fever was thus converted into bubonic plague. 'It is therefore in all probability true', says Hecker, 'that the outbreak of plague in the Russian army in the year 1770, as well as in the year 1828, was not caused by direct infection from the Turkish troops, but was merely an independent development from intermittent fever and spotted fever.'

Recent investigations in the field of medicine turn over to the other sciences all questions regarding ultimate causes, and confine themselves to what is actually observed. We know that the agents responsible for infectious diseases are specific minute organisms which must be present in the system to produce the disease in question, and that these micro-organisms are conveyed from place to place by infected persons, by intermediaries, on articles to which they have attached themselves, in contaminated food, in drinking-water, and in many other ways. Investigators have studied the conditions in which these infective agents live and the manner in which they are disseminated, they have discovered methods of determining the nature of the disease in a very short time, and they have come to recognize the danger of coming in contact with germ-bearers, that is, with persons, healthy or convalescent, who have these micro-organisms in their systems without being themselves sick. Medical science is now endeavouring, by means of systematic procedure and

splendid organization, to guard soldiers against the danger of infection ; good drinking-water is provided, the men and the rooms in which they live are kept clean, persons suffering from infectious diseases are isolated, all rooms and articles used by patients are disinfected, infected divisions of troops are quartered by themselves, germ-bearers are watched for and discovered, &c. The success of such measures is well known. The knowledge gained and profited by in times of peace is also applied in times of war, and to-day we are able to confine pestilences within much narrower limits than was formerly possible. In order to do this, however, we must have, in addition to an efficient system of transporting and feeding troops, physicians who are well informed in regard to hygiene and bacteriology.

As early as the eighteenth century, successful efforts were made to prevent, by means of energetic measures, the reappearance of plague in Europe ; the Russo-Turkish War of 1828-9 was the last war in which it broke out. On the other hand, typhus fever continued to be the Nemesis of belligerent armies, while a new infectious disease, cholera, entered upon the scene and played a very important rôle in the Crimean War, and a by no means minor rôle in the war of 1866. Along with these diseases, typhoid fever advanced into the foreground about the middle of the last century, and it soon turned out to be one of the most dangerous diseases that occur among soldiers. This appearance of typhoid fever has led some to think that the disease has prevailed extensively only in comparatively recent times. Hirsch, however, ably defends the opposite view ; he maintains that typhoid fever was in many instances confused with the *febres pestilentes, malignae, putridae*, and *nervosae*, with the mucous fevers, bilious fevers, putrid fevers, &c. In discussing the typhus-fever epidemics that occurred in the course of the Napoleonic wars, we have several times called attention to the fact that typhoid fever probably broke out in the form of epidemics ; but it could be diagnosed with

certainly only after post-mortem examinations began to be more frequent. At all events, typhoid fever is to-day prevalent all over the world, and there is always danger that field-armies will be infected with it, either in their own land or in the land of the enemy. All the wars of the last few decades have clearly demonstrated this fact.

For a successful battle against war-pestilences, it is a fortunate coincidence that the civil as well as the military authorities are equally interested in their prevention. Every military leader knows how important it is for the soldiers to keep healthy, since their efficiency is otherwise seriously impaired. It is not our task to describe the particular measures that are to be adopted; the manuals of military sanitation give us accurate information regarding these matters. We merely mention the fact that it is of great value and importance to have physicians, who are well acquainted with hygienic problems, make a preliminary examination of sanitary conditions in the territory through which the soldiers will be required to pass in order to reach the scene of hostilities.

Very great difficulties, to be sure, confront the efforts made in war times to prevent the outbreak of infectious diseases. If the struggle is carried on in an infected region, the troops are often compelled to seek shelter in infected houses; thus during the battles of Orléans and Le Mans in the Franco-German War the troops, in order to protect themselves against the severe winter cold, had to live in houses which small-pox patients had shortly before occupied or were actually occupying at the time. Circumstances frequently arise which render impossible the adoption of the most effective measure calculated to prevent the dissemination of a pestilence, that is, the isolation of infected divisions of troops; one can readily imagine how difficult this would be in the case of an army re-forming after a lost battle. Furthermore, even if one of the belligerent armies is doing all it can to prevent diseases from spreading, its efforts must

be seriously handicapped if the enemy's army does not include an equally diligent sanitary corps and does not devote the same amount of energy to the prevention of the outbreak and dissemination of infectious diseases. For even if a sanitary corps is successful in warding off a reaction upon its own troops, nevertheless this reaction is sure to take place with respect to the civil inhabitants of the country in which the war is waged.

During a war, the civil authorities must also do their part in preventing diseases from spreading to the civil population. The local administrations of a region in which fighting is going on are powerless. The generals care very little whether or not a city or village in the enemy's country is infected by their troops, whom they quarter in whatever house or place best suits their purpose. On the other hand, the communities in which military prisons are located are confronted with a very difficult problem. Since these prisons, if infected men are confined in them, easily develop into centres of infection; this fact was observed a hundred times in the year 1870. If a disease breaks out in a community in consequence of the fact that a military prison has been established there, in my opinion it is incumbent on the central government of the country to support the local authorities in their efforts to check the disease, and to give them financial help as well as scientific advice. Unfortunately, it is not to be denied that, in many small cities and in almost all rural communities, absolutely no provision is made for the isolation of persons suffering from infectious diseases; the authorities justify themselves with the reflection that in case of emergency barracks can quickly be erected for the purpose, but at the same time they fail to remember that working-men are always available in the storm and stress of war times, the building materials in the general scarcity of supplies cannot always be procured with sufficient promptitude, and the pestilences, if the isolation of the first cases is delayed, usually spread with great rapidity.

In future wars we must expect the military authorities to do what they can just as soon as the prisoners are taken, to segregate as carefully as possible all known and suspected cases of infectious diseases. The difficulties confronting the military authorities, when it is necessary to remove large numbers of prisoners with all possible dispatch away from the scene of the war, are, to be sure, very great.

Finally, we must also consider the danger to which the civil inhabitants of a country are exposed, when the soldiers return to their homes after the termination of a campaign in an infected region. It must be remembered under all circumstances that divisions, among whom infectious diseases have made their appearance before returning from the enemy's country, must be subjected to a medical examination, isolated, and, if infected, just as was done on such a large scale for example by the Japanese after the wars in China and Russia. This also applies to all other persons who have been in contact with infected divisions, particularly to teamsters.

All preparatory measures designed to prevent the outbreak and dissemination of infectious diseases must be made in time of peace; barracks and lazarets must be erected, physicians who are well acquainted with methods of hygienic investigation must be available, and an adequate number of nurses and sick-attendants must be prepared for immediate service at the very first appearance of an infectious disease. For the military authorities, who can scarcely perform all the duties that the beginning of a war imposes upon them, it will be of great importance greatly if in future campaigns the Red Cross notes its attention, not only to the care of the wounded but also, on a larger scale than it has heretofore, to the prevention of the outbreak and dissemination of war-till.

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GENERAL APPENDIX

PUBLICATIONS OF THE DIVISION OF ECONOMICS AND HISTORY

THE Conference which met at Berne in 1911, under the auspices of the Division of Economics and History of the Carnegie Endowment for International Peace, appointed three Commissions to draft the questions and problems to be dealt with by competent authorities in all countries. The first Commission was entrusted with *The Economic and Historical Causes and Effects of War*; the second with *Armaments in Time of Peace*; the third with *The Unifying Influences in International Life*. Subsequently the suggestions of the three Commissions were considered and approved by the entire Conference.

The questions are to be discussed scientifically, and as far as possible without prejudice either for or against war; and their discussion may have such important consequences that the questions are presented below *in extenso*.

Report of the First Commission

THE ECONOMIC AND HISTORICAL CAUSES AND EFFECTS OF WAR

The Conference recommends the following researches:

1. Historical presentation of the causes of war in modern times, tracing especially the influence exercised by the striving for greater political power, by the growth of the national idea, by the political aspirations of races and by economic interests.

2. Conflicts of economic interests in the present age:

- (a) The influence of the growth of population and of the industrial development upon the expansion of States.

- (b) The protectionist policy; its origin and basis; its method of application and its influence upon the relations between countries; bounties (open and disguised, public and private); most-favoured-nation treatment; the attitude towards foreign goods and foreign capital; the boycott; discouragement of foreign immigration.

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(c) International loans ; the policy of guarantees ; the relations of the creditor to the debtor States ; the use of loans for gaining influence over other States.

(d) Rivalry among States with respect to capitalist investments in foreign countries :

1. The endeavour to obtain a privileged position in banking enterprises, in the opening and development of mines, in the letting of public contracts, in the execution of public works, in the building of railways (Siberian, Manchurian, Persian Bagdad Railway, Adriatic Railway, &c.) ; in short, the organization of larger capitalistic enterprises in foreign countries.

2. The hindering of foreign countries by convention from executing productive enterprises on their own soil, e.g. from building railways in their own countries.

3. The anti-militarist movement, considered in its religious and political manifestations. (Only opposition to all military organization is here to be considered.)

4. The position of organized labour and the socialists in the various States on the questions of war and armaments.

5. Is it possible to determine a special interest of individual classes making for or against war, for or against standing armies ?

6. The influence of women and woman suffrage upon war and armaments.

7. The extension of obligatory military service in the different States, in times both of war and of peace.

(a) The conditions of military service ; the system of enlistment and of general obligatory service, the actual position of aliens.

(b) The ratio of the persons obliged to render military service to the entire population.

(c) The influence of the present system of military obligation and the organization of armies upon warfare and upon its duration.

8. The economic effects of the right of capture and its influence upon the development of navies.

9. War loans provided by neutral countries ; their extent and influence on recent warfare.

10. The effects of war :

(a) Financial cost of war. The methods of meeting it : Taxation ; International Loans ; External Loans.

(b) Losses and gains from the point of view of public and private economic interests ; checks to production and the destruction of productive forces ; reduction of opportunities for business enter-

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prises ; interruption of foreign trade and of the imports of food ; the destruction of property ; shrinkage of values of property, including securities ; financial burden caused by new taxes, debts, and war indemnities ; effects upon private credit and upon savings banks ; advantages to those industries which furnish military materials ; advantages and disadvantages to neutral countries.

(c) The effects of war upon the supply of the world with food and raw materials, with special reference to those States which are in large degree dependent upon other countries for such supplies, e.g. Great Britain and Germany ; by diversion of capital from those countries which produce food and raw materials (especially the stoppage of railway building and of new investments in agriculture and other industries).

(d) The condition of the victorious State : manner of levy and use of contributions and war indemnities ; influence upon industry and social life.

(e) The manner in which the energy of nations is stimulated or depressed by war.

11. Loss of human life in war and as a result of war : influence upon population (birth-rate, relation between the sexes, ratio of the various ages, sanitary conditions).

12. The influence of war and of the possibility of war upon the protective policy, upon banking conditions (especially upon banks of issue), and upon monetary systems.

13. The influence of annexation upon the economic life of the annexing States, and upon the State whose territory has been annexed.

14. The annexation of half-civilized or uncivilized peoples, considered especially from the point of view of the economic interests, which act as motive powers ; the methods through which private enterprises take root in such regions and through which they bring influence to bear upon their own governments ; the effects of such annexations upon the development of trade with the annexing State and with other countries, as well as upon the economic and social life of the natives.

15. The progressive exemption of commercial and industrial activities from losses and interferences through war.

16. Influence of the open-door policy upon war and peace.

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Report of the Second Commission

ARMAMENTS IN TIME OF PEACE. MILITARY AND NAVAL ESTABLISHMENTS. THE THEORY, PRACTICE, AND HISTORY OF MODERN ARMAMENTS.

1. Definition. Armaments might be described as 'the preparations made by a State either for defence or for attack'. These would include the provision of food, financial preparations, and also semi-military railways, canals, docks, &c.
2. Causes of armaments. Motives for increasing or commencing them, distinguishing the great from the small powers.
3. Rivalry and competition in armaments. Motives and consequences of rivalry, with the possibilities of limitation.
4. Modern history of armaments, with special fullness from 1872. To be noted as important landmarks :
 - (a) The introduction of conscription into Germany, France, Austria, Italy, Japan, &c.
 - (b) Modern inventions affecting war.
 - (c) The question of privateering and private property at sea.
 - (d) Duration of military service.
 - (e) The traffic in arms.
5. Military budgets from 1872 (distinguishing ordinary from extraordinary expenditures).
6. The burden of armaments in recent times.
 - (a) The proportion of military to civil expenditure.
 - (b) Military expenditure per capita.
 - (c) Military expenditure from loans in time of peace, i.e. a comparison of expenditure from taxes with expenditure from borrowed money.
 - (d) Comparative burdens of individual taxpayers in different countries and the extent to which the differences are due to armaments.
 - (e) Military pensions.
 - (f) It is desirable to ascertain where possible the ratio between the total income of each nation and the total expenditure on armament at various times.
7. The effects of war preparations upon the economic and social life of a nation :
 - (a) On the sustenance of the entire population of a country at war.

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- (b) On railway policy.
- (c) On public administration and on social legislation.
- 8. The economic effects of withdrawing young men from industrial pursuits, into the army and navy :
 - (a) Compulsory.
 - (b) Of non-compulsory service (specially in the case of mercenary troops).
 - (Allowance being made for the industrial value of military education and training.)
- 9. The influence of changes in the occupations of a people upon the composition and efficiency of armies, and the influence of the changes in the composition of armies on the economic life.
- 10. Loans for armaments (participation of domestic and foreign capital).
- 11. The industries of war, i.e. the various manufactures and other industries which are promoted and encouraged by military and naval establishments, distinguishing between :
 - (a) Government undertakings (arsenals, dockyards, &c.).
 - (b) Private undertakings, including the history and working of the great armament firms, which sell to foreign customers as well as to their own governments.
- 12. War materials (munitions of war). Their recent development and their cost. This includes arms, ammunition, armour-plate, war-ships, guns of all kinds, military airships, &c. So far as possible the effect of recent inventions upon offensive and defensive war should be indicated.

Report of the Third Commission

THE UNIFYING INFLUENCES IN INTERNATIONAL LIFE

1. The Conference is of the opinion that the economic life of individual countries has definitely ceased to be self-contained ; and that, notwithstanding the barriers raised by fiscal duties, it is becoming in ever-increasing measure a part of an economic life in which the whole world participates.
2. It desires that this change be studied with the object of ascertaining to what extent the economic life of individual nations has ceased to be self-contained, and the causes which are bringing about the greater interdependence of nations.
3. Special attention should be paid to the following factors :
 - (a) How far the growth of population is responsible for the changes that have occurred and are in progress.

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(b) The extent to which the insufficiency of the natural resources of individual countries for their own requirements has contributed to it.

(c) Whether the increasing economic unity of the world is the cause or the result of the rising in the standard of living, and how far the increasing welfare of nations has been caused by the growing unity.

(d) In what measure the need of individual countries to obtain materials of production from other lands and to find new markets for their own products is responsible for the growth of international dependence.

4. The Conference desires that investigations be made into :

(a) The volume of the world's production of all the many articles of food, of the various raw materials, and of the principal manufactures.

(b) The productions of individual countries, and the extent to which they are retained for home consumption or are exported.

(c) The consumption of individual countries, and the extent to which the various articles are supplied from home productions or are imported.

5. The Conference wishes to ascertain to what extent the economy of production by large units, instead of by small units, has contributed to the international dependence of nations.

6. The development of this world-embracing economy has taken place in great measure in consequence of the investment of capital by rich countries in less developed lands. Through this there have arisen close relations and a great increase of wealth, not only for the lending and the borrowing countries, but for all nations. The Conference is of the opinion that researches should be made into the extent of the interdependence of the nations in the matter of capital.

7. The Conference desires to institute inquiries into the interdependence of the financial centres of the world.

8. The Conference desires to make the unifying effects of international trade, the building of railways, the progress of shipping, the improvement and extension of all means of communication and the progress of inventions, the subjects of careful investigation.

9. The Conference is in favour of making a comprehensive study of the various international unions and associations, in which the social and economic interests of all classes of society are now either organized or in process of organization, through official or private action.

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